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ABSTRACT

Twelve papers are presented from a conference on special education and information technology. The conference featured 130 participants from 15 countries. The following titles and authors are represented: "Computer as a Communication Aid" (A. Fleischer); "Computers in Special Education" (F. Dalhoff); "Experiences Using Computer-Assisted Communication Aids" (F. Johnston); "Computer Based Communication Aids for Non-Vocal Handicapped Persons: Experiences and Perspectives in the French Rehabilitation Center of Kerpape" (A. Sylvestre); "What Can We Use Microcomputers for in Schools?" (C. Wang); "Use of Computers in Special Schools: Report on Experience in the Classroom" (P. Murphy); "The Computer as an Educational Tool" (B. Pedersen); "Computers in Special Education" (B. Larsen); "Using Micros in Special Education in England, Wales and Northern Ireland" (M. Hope); "Computers in Special Education: Eurydice" (N. Levysohn); "A Help to Meet the Information Explosion" (H. Kristiansen); and "Advantages and Drawbacks of the Information Technology in Relation to the Definition 'Handicap'" (J. Hansen). (CL)

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COMPUTERS IN SPECIAL EDUCATION

A Report from the First European Conference Concerning Teaching and Training the Handicapped through the New Information Technology.

Middelfart, Denmark
7th-11th May 1984

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Introduction

This report consists of various papers presented at the first European conference on special education and the new information technology. The conference took place in Denmark in May 1984.

The conference was arranged and carried through in cooperation between the Danish and the European Association of Special Education (DSFP and EASE) and the Danish Ministry of Education. It was supported by the Commission of the European Communities and the Nordic Council.

130 participants from 15 countries attended the conference. This large number of participants, the activities and discussions proved great interest in the subject in general and in international cooperation about it in particular.

It is not the intention of the report to reproduce these discussions, much less to reflect the activities of the conference. However, the contents show the perspective and the tendencies in the cooperation between the computer and the handicapped student.

I do hope and believe that this report will be a contribution to a qualified and progressing further development of the new information technology in the field of special education.

March, 1985

Jørgen Hansen
Superintendent of special Education
Ministry of Education

A Recommendation

To the Commission of the European Communities and the Nordic Council

Concerning the application of new Information Technologies in Special Education (whereever and whenever this is provided in ordinary schools, in specialschools or at home, in early infancy and in adolescence) and the need for cooperation at a European level.

Introduction.

A meeting was held at the European Commission buildings in Brussels during Spring of 1982 for 'experts' from various European countries. Following the meeting Mr. Jorgen Hansen, on behalf of the Danish Ministry of Education and the European Commission, undertook a survey of activities in Special Education in a number of different countries. Following his report on this survey an international conference was convened in Denmark with the purpose of finding a way forward as well as disseminating information about experiences in the different European countries.

1.
A group of teachers, school psychologists and administrators in the field of Special Education from 15 European Countries (both in the E.E.C. and the Nordic Council) attended the conference in Middelfart, Denmark during May this year. Financial and administrative support was provided in the first instance by the Commission of the European Communities, by the Nordic Council and by the Danish Government, and in the second instance by Groups such as E.A.S.E. (European Association for Special Education - an Nongovnmental organisation), E.U.R.Y.D.I.C.E. and E.U.D.I.S.E.T. Observers were also present from the Council of Europe.

THe participants at the conference wish to express their strong feeling that there is a need for more organised cooperation within Special Education and wish to propose some appropriate ways in which that need could be met. The concern has been emphasised following discussions during the conference, and information from

the key inputs. The latter reflected the wide variery of developments in the different countries of the Commission of the European Communities and the Nordic Council.

2.

Discussions during the conference served to reinforce the recognition on the role of the new Technologies in both the Education and the training of the handicapped people. Recent developments have shown us that the new technology is, however, able to both modify and to create a handicap. Without active intervention in these developments from professionals and from handicapped people themselves, the handicapping effects could become more widespread than the modifying ones. Fot that reason it is imperative that persons with developmental and/or functional impairment, as well as those at risk of becoming functionally impaired, get optimal opportunities to:

(I) learn about computers and the technology as a whole
(ii) learn by using the computer
(iii) use the computer as a personal supporting aid in daily interaction with others.

3.

Because of the very specialised topic and the small number of persons with different developmental and functional problems in any single country (especially the small ones) it seems both necessary and appropriate to organise cooperation between the countries in Europe who wish to be involved in this area of development. Representatives from all the countries from the E.E.C. and Nordic areas at this conference agreed that the application of the technology to the advantage of the handicapped people will be cheaper, more efficient and therefor much more comprehensive if the countries cooperate in implementation, investigation, production and distribution of information and material in this field.

Without such cooperation the present confusion about compatibility and the problems associated with producing high quality educational software and appropriate hardward will continue. It could, in fact, develop in the wrong direction.

4.
For the reasons mentioned above, the participants in the conference and the host organisations, request that the Commission of the European Communities and the Nordic Council give urgent consideration to establishing appropriate methods of support for developments in this important area.

We believe that a primary objective should be to initiate, stimulate, coordinate and organise, in cooperation with appropriate national bodies, the efforts that, at a European level, would lead to better utilisation of the new technologies as a special pedagogical aid.

Specific areas that require action include:
(a) the organisation and exchange of information about microtechnology in Special Education in Europe.
(b) establishing opportunities for the exchange of information with relevant countries outside Europe
(c) advising both international and large or small national computer companies about the additional demands that will be made on their equipment by the functionally impaired
(d) giving advice to both the Commission of the European Communities and the Nordic Council about the most appropriate financial investment in a particular field
(e) encouraging the development of common standards for software and hardward to be used in Special Education.
(f) organising European courses, meetings, conferences and teacher visits in other countries to study their users of the new technology. (In this exchange we should include visits to relevant countries outside Europe).
(g) the registration and the distribution of information about software production in the different countries in Europe
(h) initiating and supporting cooperation between the educational, the social and the medical sectors concerning their application of new technology in the service of the functionally impaired.

5.
The conference identified some specific projects that could, at an early stage, be undertaken:
(a) study and survey existing communications aids
Study and survey existing sotfware for Special Educational help.
(b) study the need for and the types of switching devices and other machine/person interfaces
(c) study what would facilitate good software exchange.
(d) establish feasibility of international data bases.
(e) establish feasibility of exchanging software and related materials through communications networks.

It would be essential for a framework and a base to be established within which and from which this could happen.

6.
On behalf of the participants at the conference, and the organising associations, we wish to underline this recommendation by stressing that technical development is moving ahead fast. For this reason prompt action both now and in the future is vital.

As an initial step an opportunity for a discussion of these proposals with the Commission and/or the Nordic Council, at an early date, would be appreciated.

Jorgen Hansen
Conference Chairman

Paul Murphy
Repporteur for the Conference

Welcome to The Conference

Holger Knudsen

Director of Primary and Lower Secondary Education, Teacher Training Colleges, etc., Ministry of Eduction
Denmark.

Dear European friends. It is a great pleasure for me - on behalf of the Ministry of Education - to welcome you to Denmark and to this conference.

I hope that you have already experienced that the information technology is a subject which in general occupies Denmark to a very great extent and that its applications in special education - in particular in the very recent years - have aroused a very great interest.

It is particularly when it comes to the education of pupils with functional difficulties that the computer may have quite unique possibilities which may be hard for us to imagine right here and now on the threshold of the information era.

In this society of the future, information will be a decisive factor of power or put in nicer terms: Information makes competent.

People who are not so good at communicating - i.e. receiving, processing, and transmitting information - will be handicapped. It is therefore a duty beyond dispute for all of us who are working in the education sector to be instrumental in bringing about the information technology to all pupils - regardless of their functional level - both in order to support the pupils who are clearly mentally of psysically handicapped, but definitely just as much to avoid the creation of new groups of handicapped as a consequence of the general effects of the information technology.

But, like with any other innovation, very different attitudes have been voiced about this new technology - in this country - and this has no doubt also been the case in your countries. These attitudes stretch - as is well known - from one extreme that the technology should be introduced as quickly as possible on all fronts without any delaying discussions about the humanistic and materialistic consequences - to the other extreme where the main point of view is that one should keep one's hands off the nuisance which will, at any rate, only result in alienation, increased unemployment, etc.

As already mentioned, there have been such discussions prior to all technical conquests. They have never been able to prevent the innovations from being made, but they have been able to delay their time of appearance.

There may be both advantages and disadvantages involved in this. The advantages are - for instance when it comes to the information technology - of course connected with the fact that people hereby have the time to discuss the best possible introduction of the technique, i.a. with a view to avoiding unfortunate consequences, whereas the disadvantages are just as naturally connected with the fact that a country may very well wait for so long that it lags behind the surrounding world which every country in our modern times forms an integrated part of.

In Denmark, the discussion of introducing 'computer science' (as we have called in Denmark) as a subject in the basic school started in the middle of the 1970s, but only now it will - in all probability - be adopted for introduction from the school year 1984/85 by an amendment of the Act on the Folkeskole.

The Danish model for the introduction of information technology as a subject in the basic school builds on the basic principle that computer science <u>as an independent subject</u> is to be offered as an elective subject and only in the last forms (8th to 9th forms), whereas it - as an obligatory theme - is to be comprised in a number of existing subjects at an earlier stage of the course of education (already from the 4th form).

Behind this principle lies of course the presumption that the whole technical, social, educational, and psychological nature of the information technology will be brought about in the best possible way in connection with the other subject-themes which form part of the world in which the information technology and its users are to function. The actual specialization represented - if ever so modestly - by the elective subject 'computer science' is thus voluntary for the oldest pupils. Such a voluntariness is naturally not unproblematic either: a considerable fear has already been voiced as to the risk that girls would choose this subject to a far lesser extent than boys. This is alarming. This information society should preferably not begin by laying the foundation of a new and quite incalculable sex descrimination.

We must, however, get started and see what happens, for it is not possible - in this area either - to predict all positive or negative consequences of the strategies which are chosen by for instance the education sector.

It must be allowed to proceed by the method of trial and error and to make mistakes, but it must also be a quite natural obligation to correct these mistakes as quickly and effectively as possible.

The current correction of our endeavours to prepare children and young people for the society of the future requires open-mindedness and an unbiassed debate where we have the courage and want to exchange good as well as bad experience.

In this process, international activities are a quite decisive prerequisite, and I take the liberty here tonight to express my own and the Ministry of Education's unreserved acknowledgement of the fact that you have had such a fast and very active start as is the case, and this conference is an excellent expression of this.

I shall complete this toast to the information technology with a little stanza from an old, but all the same contemporary Danish

poet, Piet Hein, who, I believe, is also known outside Danmark for his technical new thinking and humane vision.

Who do you think will pay
for gifts that Technology gave?
Chaining a slave to yourself
you're chaining yourself to a slave.

Sharing your will with one
you've taught to grow smarter and faster -
who will be slave and who
master?

Computer as a Communication Aid

Anne Vibeke Fleischer
Ministry of Education, Denmark.

Our Subject to-day is the use of microelectronics as communication aid. I shall begin by saying something more generally about the subject, and after that Frank Dallhoff is going to tell about his experiences as a user of a communication system.

In Denmark we have just lately started to investingate the possibility of using microelectronics as communication aid to severely handicapped children and grown-ups. Few years ago a project started with the use of microelectronics for two severely handicapped children without speech. The projectleader was Bent Larsen, who will tell about his experiences this afternoon.

In January this year the Ministry of Education arranged a national conference. The aim was to gather information about computers in special education. Before the conference, questionnaires were send to all the municipalities to investigate, how many projects were going on. The results from the questionnaires showed that seventeen projects were working on the use of computers in special education. Only two or three projects were working with computers as a communication aid. The other projects focused on education in math and Danish.

It can hardly wonder that we here in Denmark have beginner-problems too. When the computer is used in special education, the programmes are nearly exclusively of the type: drill and practice. Hopefully this don't disclose our opinion of the content and aim of special education. Rather it is a result of our national problem: the programmes are developed by teachers with lack of experiences of programming, so the programmes do not utilize the power of the computer. In Denmark we still miss an organization of information spreading and teacher education in the area of computers

in special education. We can only look with envy at the English organization SEMERC, which Mary Hope is going to tell about later in this week.

The project where I am collaborator is named DUKOM, which means "Datamatstøttede systemer til undervisning og kommunikation",in English: computerbased systems for education and communication. The DUKOM project is sponsored by the Department of Technology. The aim of the project is to investigate and evaluate the possibilities of using computers in special education and as communication aid. Our work deals with information gathering from parallel or similiar projects. This information we have mainly got from England, who have stolen the march in this area. Additional information is gathered from USA, Sweden and France.

The other part of the DUKOM project consists of obtaining experiences from direct testing of microcomputers as communication aid for severely physically handicapped non-speaking children. For the present we are testing the system called Compact, which Frank is going to tell more about. Our user of Compact is a twelve years old boy, Jakob, whose only self-directed communication is facial expressions and manifestation of "yes" and "no", which he express by respectively opening and closing his eyes. Jakob is too young to take part in this conference, so we asked Frank to join us, which is to prefer as Frank has experience in using Compact over a longer period.

During the next month we are starting to test two computers with communication programmes. We have not yet had the possibility to try a quite ideal communication programme. The best programme we have seen is the Mac-Apple, where Mac means Microrom-puter Assisted Communication. As the name says the programme is developed to the Apple computer. The programme is written by Patrick Poon, Kings College, London. The very high quality of the programme is dued to Patrick Poon's close co-operation with Carlton Park School, London, which is a school and a guidance center for physically handicapped children. We hope to get the possibility to try the Mac-Apple soon in a Danish version, that means with the Danish letters Æ-Ø-Å.

Carlton Park School has just recently started to work with the Mac-Apple, and their experiences are quite positively. We are attracted by the many possibilities of the programme. The screen picture and the cursor is very suited for children with figure-ground difficulties. The work bank is big, and the user can edit it himself. A graphic and a calculation programme is included, though it is not a calculator (you have to make the results yourself). And you can make a little presentation programme to the single user, for example: "My name is Mark. I am 8 years old...etc". The keyboard can be moved to the display and it can be redesigned within a grid which can content the whole keyboard with function keys or be limited to for example four letters or words. The keyboard at the display can be directed by a switch with one, two or eight choices.

As our target group is children without speech or with nonunderstandable speech and with a psychically handicap, the switches for activation of the programme are a problem in ifself. The primary aim is that the user can operate the communication system without being dependent of helpers. As it is children with reduced possibilities of moving and often with poor muscle power the princip must be, that the smallest possible minimum of input leads to as much output as possible.

A further problem with these children is, that it can be extremely difficult to find a stable controlled movement for activation of a switch, so a close cowork with the physiotherapist and the occupational therapist is a given necessity.

Another problem is, that the child's use of a communication system must not collide with other activities, which the child can master. The before mentioned boy jakob is able to steer his electrical wheel chair with the chin. But he also activate Compact with a chin switch, so it is impossible for him both to move around and to communicate. As long as this problem is unsolved he is unable to utilize the obvious advantage of Compact: that is transportable.

Jakob's actual problem leads us to another problem. When a communication system shall be a substitution for speech it ought to be usable in all situations, just like speech.

No system can honour this demand. Therefore you can't find the system for a given user, but we can get closer to the ideal situation by providing the user with more systems. The choice of these systems can first be taken after a close analysis of the user's dayly life. A few examples may illustrate this point:

A pupil without speech have a need for a computer with wordbank and wordprocessor. The computer is fastened at the wheel chair, and she can activate it satisfying with her head stick. The same pupil is sometimes on picnic where she, laying in the grass, is unable to use the computer. Or she is by the beach or driving around in rainy weather, and the computer does not go together with sand or water. But she needs these adventures, and she needs to communicate. So she needs supplmentary systems, which in this case could be just a little table with a few often used words.

Another pupil without speech needs the same advanced communication programme for the computer. This child is able to walk, even if her walking is a bit unstable, and therefore the computer can't be transported around together with her. She need a body-worn microelectronic system, for example something like the English system Vocaid. Vocaid consists of a small box with a keyboard on the touch sensitive surface, where the choosen letters or preprogrammed sententes is pronounced with synthetic speech. A preprogrammed sentences could for example be "I can't speak. How can I get to B-a-l-l-e-r-u-p", where the name of the location is spelled by the user. This girl could also use a simple letter table for example in bathing situations.
This must be problems enough for now. So I will pass the word to Frank.

Computers in Special Education

Frank Dalhoff
Birkerød, Denmark.

The history of this communication instrument starts at the Danish academy of engineering. There was a group of students from the graduating class, who as a final project had found out that they wanted to make a transportable communication instrument. The group got in contact with 3 occupational therapists who later became counsellors together with others for the project. The first time I heard about the project was when I got a quistionnaire at the institution where I live. The purpose of the questionnaire was to find some people to test this device. I got chosen because I had a communication instrument already so I was able to compare the two.

The goal for this group of students were to develop a small transportable communication instrument, which could be adjusted to the individual user, that means that it could be operated with different keyboards or contact. The instrument should be made in a way so it could be used by a Bliss user as well as the normal used letters. As I said I already had a communication aid but it had some defects. First of all it was very big and therefore it was difficult for me to have it with me. Secondly it didn't have whole words in it which ment that I had to write each word letter by letter. Even if the aid in many situations was a big help for me, I often used a letter board which my mother and I made with a few words. Because of those words it was easier when I should talk to one person. One of my first demands was therefore that the new instrument should contain whole words. One of the problems when you cannot speak is that it takes a long time to communicate with others which means:

1) that you give up in advance

2) or the person you want to talk to give up,

not to speak about when you do not have your communication aid with you. It is therefore very vital that the keyboard or the contact is made so easy to use that the communication rate can increase. A way to do that is by testing instrument together with each user, (so you make sure that he or she fits the aid). It is no use to give a standard keyboard to a user if he takes too long to use it. It is here this aid has its advantages. Every time the project have given a user an instrument the counsellors had done a great deal of work to find the right keyboard, which means that nearly all the users have a different keyboard. One of the users could only move one finger 1 centimeter. It was not much to work with but after some time they made a switch that made it possible for him to communicate. At the same time the instrument is adjusted to me, who has bigger movements so it is very flexible. Even I who had other communications aids to start with in the project this new one has got me much closer to an easy and free communication. I have got many positive remarks after I got this aid. My home helpers have said two things which they think have helped them in the communication with me. First of all they can do other things when we talk, because they do not have to stand next to me and see letter by letter what I want to say. Secondly it is much more fun to talk and discuss with me now. I can also write a message and print it to my home helper who wakes me in the morning, or print another message to my personal helperso that she can start a phonecall for me by reading the message aloud, after that I can often finish the call by the few sounds I can say. I could tell many other situations where it would be difficult without this instrument. But there is specially two situations which I think shows how this instrument has made my life more like that of normally speaking people. The one was on the ferry between Sealand and Jutland where it was possible for me and a friend to talk together like other people. The other was when I participated in a conference where I could talk with the others without big problems. This instrument has given me the opportunity to get into contact with other people. I have often feared being in a new group of people without my personal help. After I got this instrument I am not that afraid, but of course I am nervous like anybody else when I am going to make a speach.

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The most important about this instrument is that you can take it with you nearly everywhere. I think it is very important to be able to communicate in as many situations as possible. Fx. it is good to teach little Peter to use a typewriter but it is no use for him when he goes out to dine with his parents. I mean therefore that it is important to get many different communication aids. If I look at myself I am writing a lot not only because I can not speak but also because I like to write fx. books. In that situation my typewriter is more convinient, but of course I could use this aid, I just feel that the size of the typewriterpaper is better. But when I am at a meeting I do not know what I should do if I did not have my aid, I can talk and take notes. Even in a big group everybody can see what I am saying as I can connect the aid to a bigger screen. What I have tried to say is: it is important to aim at as many different communication aids as possible. Much of what I have been saying goes back to contact. Contact with other people. Let us imagine me coming to this conference without my instrument. How many do you think would try to talk to me? Maybee 1 og 2. Now it will be many more who will discuss the instrument with me. After all it is not everybody who are driving around looking like a robot with all this put on the chair. People think, "what is that"? and they will come and ask I am sure.

Another problem this instrument solves for the non-speaking person is that the person can say which level he or she want the conversation on. One of the users in the project who lives at an institution has the problem that the personnel would come in being happy and talking about the weather even though he wanted to talk about other things and it was not possible for him to get them to change the subject. But now with the instrument on the chair he can choose the subject or try to!

Another thing that is very important to be aware of is to find the right communication aid for the special user. To get a communication aid is like buying new shoes. If they are too big the person might fall and if they are too small the feet will hurt. It is in the same way when you try to find a communication aid which the user and her surroundings can feel comfortable with. It is here the occopational therapist and the teachers together with the user

have to work to find the right communication aids which fit the user. One thing this project has taught us who have been involved is how important testing and adjusting is. You might think that you have found the right instrument but after a while you discover that something could be better. People who use a communication aid are often very handicapped, therefore the position they are in when they use the aid can mean a lot. Fx. if you use your left hand the aid has to be to the left side and maybee tilt a little. It will often be practical to place the keyboard and the screen so that the user can see without moving her head. The form of the keyboard has to be chosen with care. You can form it in many ways. When I was going to have mine we talked about making it like a half circle. If you look at my need stick it is the most natural way, but we dropped it because I can use a normal keyboard. The contact on the keyboard can also be in different sizes it can be 2 x 2 inch or a very small one. A help to use a normal keyboard can be if you use a shield on the keyboard. The shield with the right holes will help steer fx. my headstick to the right key. If the shield was not there I would probably hit 2 keys at a time. Another help can be a rail so I can skate along the letters. The stick can also be in different ways so it fits the keyboard. Finally you can have people who have either so big movements or so small movements that it is difficult to construct an aid for them. Then it is important to be untraditional and full of fantasy. When we in the project found a thing we did not like we always tried to adjust it together with the occupational therapists. As much adjusting as we did would be very expensive in a production, but some of it would be necessary, I think.

This communication aid has solved many problems. But it has raised others. Problems which have showed up because we as users put up new demands. But there has also been and there will come more problems, specially ethical problems. If we start with the ethical problems, it actually is the question who is going to form the language for the users. Because the readymade words are a part of the users vocabularly and that means a part of the person's personality. We do not all use the same words and of course the producer will take a list of the most used words. But languages are both deter-

minded by age and environment. These I think are important things to think of when you make a word list. I fx. would never use "axe" but the word is in my wordbank, that space could be used by another word. I think that the user and the teacher or other people there are together with the user should make the word list and maybe it should be made in a way so it could be changed so if you got the instrument as a child you could get new words as you got older. But of course that would be expensive. The other thing I said about the user raising new demands comes from the fact that this group of people have just started a new life. A life where they are allowed to talk and therefore they find out that life maybe can be changed so they can communicate even better with more shades or directly on a phone without help from another person. Maybe they can be (if they are not too handicapped) able to tear off the paper themselves when they have used the printer. These are all things that would make the user a little less handicapped. The user should also in that way get a little more private life which can be difficult to have otherwise. I myself would like the instrument to be able to connect to a drawing machine which I should be able to steer by this instrument.

<u>The instrument are able to:</u>

1) be used as a normal typewriter
2) under each letter I have word bank
3) here are the wordbank I talked about
4) this is the memory I use when I take notes. The memory can have 7 screens full
5) here are the printer, I can print the things I have in I have memory later if I want to.

Experiences Using Computer-Assisted Communication Aids

The paper considers the beneficial impact of communication aids for the disabled and offers an account of some of these benefits as observed in Scotland. The problems associated with their use are then discussed, at general and specific levels. Means towards the better management of some of these problems are suggested.

F. Hope Johnston
Edinburgh, Scotland.

Experiences Using Computer-Assisted Communication Aids

INTRODUCTION

The approach to this paper is eclectic. In Scotland, a country of 5 million people, developments in the field of communication aids are patchy and unco-ordinated. I have had, therefore, to pick up my information where and when I could on sites where I know that research and development is being undertaken and among people to whom I have been introduced more or less at random.

My position as a research officer attached to a department of central government offers me contact with many diverse practitioners in universities, colleges, schools and (occasionally) clinics as well as with administrators at various levels. Some of the members of the informal networks with which I thereby come in contact have helped me to analyse the impact of technology and various types of disablement. To them I am grateful.

I have chosen to phrase "communication aids" widely. seems to me justified, etymologically if in no other way, to regard any device which helps one person to receive a "message" from another, or to express himself to another, as a "communication aid". I have not, therefore, restricted my search for evidence only to the motor- or speech- impaired, as some papers would (the Manpower Services Commission, for instance, gives an example of a communication aid "electronic writing systems for people with impaired hand movements or speech"); but rather, have examined cases where it seemed to me that there was considerable difficulties, physical incapacity or intellectual handicap, and where an electronic device was used to assist in that information exchange. My respondents have not all been disabled; indeed, the majority have come from the research side, or from education, or from administration, and speak on behalf of, rather than as one of, the handicapped.

One of the problems I encountered in gathering material for this paper was the dearth of written evidence. In Scotland, at least,

where developments are not so far advanced as on the other side of the Atlantic, evaluative procedures have produced little in the way of concrete data as yet. My approach has therefore been illuminative, in keeping with the notion of "experiences" in the title to this paper, and has resulted in a compendium of impressions reinforced several times over, together with an analysis of their implications.

I have chosen to consider first the benefits accruing from the technology, and then its disadvantages. It will become apparent that the latter appear to outweigh the former, at least in terms of the space and attention according them here. I attribute that to no natural order, but to the fact that many of my interviewees were creating, developing, adapting or administering aids rather than using them. Those who were using them were noticeably less problem-oriented, and more positive in their appraisal of the impact of the technology.

THE BENEFITS OF TECHNOLOGY WHEN APPLIED TO COMMUNICATION PROBLEMS.

The impact of handicap upon the lifestyle of the disabled is typified by a lack of self-dependence, of self-esteem, of privacy, of achievement, of communication (whether outgoing, for the speech-impaired, or incoming, for the blind, or both, for the deaf) and above all by a lack of control over the day-to-day events of life. This leads in turn to a sense of frustration and humiliation, of isolation and of helplessness. Any means of reducing these adverse effects must be welcome, and it has been our experience, in Scotland as elsewhere, that communication aids, both computer-assisted and free-standing, can do so.

Examples follow.

Competence in Employment.

A university lecturer of mathematics, one of my respondents, explained how gradual loss of sight was beginning to affect his capacity to read documents, a skill essential to his work. The

use of the Visualtek, a closed-circuit television camera which simultaneously "reads" and transmits text in enlarged size via a VDU, has offered a means whereby he can continue to operate independently in the work situation. (There are problems associated with the device, but we will consider these in the next section).

The first blind Careers Officer in Scotland is able to operate with the competence of a sighted person through the use of Optacon, Versabraille, printer and pocker tape memo. The Optacon is used as a reading tool, mainly with reference materials such as memos, circulars and her own correspondence, and is particularly valuable for reading confidential case-notes. It would be inappropriate for an assistant to read such notes to the non-sighted officer in view of their private nature; yet by their nature they are not accessible in Braille. The Optacon solves both problems. With a typewriter attachment linked to the Optacon, she can add to these notes and records. The other hardware makes it possible for her to store interview data and to prepare lengthier reports. Totally independent operation within the job would not be possible without the use of the aids.

Telesensory Systems Inc. themselves offer case-notes on the vocational uses of the Optacon, including employment as a telephone reservation agent, bank instalment loan administrator, radio archivist and public health nurse. The applications of this versatile aid are endless in situations where freedom from a dependency on Braille-transcripted materials is essential.

The Microwriter, which started as an all-purpose (non-disabled) aid for the production of printed records for those who wanted to type in transit, has become a firm favourite of the handicapped because it is easy to transport, relatively quick to learn to use and silent in operation. One example of its use, promoted by Manpower Services Commission in Scotland (as were the two cases above) is in court work for a blind law graduate now working in community service social work. In court and in cells, no tape recorders are permitted; the Microwriter, with its memory, audio unit and printer attachment, overcomes these

obstacles, while offering an aid which enables communication of findings in an acceptable form to the sighted world, without the need for an intermediary.

An extreme case was that of a client of MSC, physically disabled from the neck down, employed as a non-executive director. He was responsible for the financial control of 18 subsidiaries for each of which he had to produce a quarterly financial statement of activities. He further had to provide a report to guide the executive directors of the parents company as to future action. MSC provided 2 Apple computers with 3 (one dual, one single) disk drives, 2 monitors and 1 printer. The first Apple computer was used to drive the second, and was programmed with the Micro Assisted Communication (MAC) software which enables the disabled to speed up their rate of communication. The second computer was loaded with software programs such as VISICALC or Applewriter, depending on the work to be done. By means of a dual switch system, the client operated the first computer, enabling him to produce text via the Applewriter wordprocessor software or to generate trade manufacturing profit and loss accounts via the VISICALC program. The work output could be stored on disks and retrieved at a future date. The printer provided the written communication needed.

Independence and Communication.

For those who are speech impaired but not language-disordered or intellectually deficient, their disability is a prison. In the course of my interviews, I met one such person who had no functional speech and erratic motor movements (as a result of cerebral palsy) but with whom I was able to converse alone for ever an hour through the use of a Memowriter, a small portable electronic keyboard with LCD display. The prime benefit in this situation, we both agreed, was that our conversation could be private, free of the necessity for an intermediary, utterly silent if need be, and impermanent (although we could have kept notes on it had we wished). Above all, it afforded independence; perhaps for the first time in her life, this handicapped user found herself talking at length to a total stran-

ger about an issue on which she was something of an expert. She had also, and this was extremely important to her, found privacy in the confessional in her communications with her priest; and sociability in an evening club, where she could talk to anyone and everyone, independent of their ability to understand her vocalisations. The freedom which this represents to the handicapped user cannot be overemphasised, and the obvious delight which this user took in its enjoyment was telling.

Other impressive accounts have reached us from the educational sphere. In one school for the severely handicapped a Turtle was introduced - not normally cited as a "communication aid" but in this case most effectively used as such. A case study of one autistic boy with poor expressive language skills has indicated that, as a direct result of exposure to learning with the Turtle (for overall some 2o hours), his use of expressive language has improved markedly, as have his relationships with others. Two hyperactive teenagers offered unexpected results; it was hoped that turtling would improve their under-used expressive language skills, and this did indeed happen, with a great deal of interactive verbal communication showing fluency and facility with new vocabulary; but in addition, directional abilities and spatial skills emerged which had hitherto lain dormant. The headteacher's report states:

"A more able boy of lo who had highly distractible behaviours and who used his language skills in a most disjointed and non-sequential manner paid instant and interested attention to the Turtle activities. With no obvious difficulty he moved through his introductory stage with no more effort than any other boy of his age. All the while he interspersed his actions with very relevant and cogent statements and questions, the answers to which he acted upon. Many of his activities hithlighted abilities that were not previously attributed to him - indeed he has been regarded as a boy with many spatial difficulties. What did emerge, though, was that he had quite a marked deficit in visual closure skill. By the end of two sessions he was recognising that he was not completing a shape making task, but was making extra efforts to do so".

Mentally handicapped children with additional physical impairment showed particular delight in the control aspects of turtling: excitment, keenness to do more and a desire to know more about the complicated drawings Turtle could make were all evident.

Motivation.

Clearly, in the previous section, motivation was heightened among handicapped children by the use of aids. Is it so with adults? In all the cases looked at so far, motivation to learn to use the technology was extremely high among children and adults alike. Additional evidence of adult motivation has been made available to me in a report prepared by occupational therapists working in hospitals throughout the UK. In these settings, "motivation" was a word used again and again of patients who were otherwise difficult to interest or enthuse; in Edinburgh, the computer had been used successfully to introduce a withdrawn teenage boy to occupational therapy, to aid patients in communication with family and friends at a distance using the word processing facilities, to carry out functional assessment of upper limb capacity with a non-English-speaking patient, to promote group interaction via quiz games, to reintroduce a computer programmer to work, following an accident and hospitalisation, and to familiarise a newly-disabled accountant with the hardware prior to its being stalled by MSC at his place of work. All these uses illustrate aids to communication and independence of one kind or another; all would have presented problems, some insurmountable to the hospital staff, and their solution has been facilitated by the subject now abounds with examples of heightened motivation through the use of computers, (see particularly "Learning to Cope", 1982 and 1983 editions) and it will suffice merely to record it here as having been one of the many benefits of the introduction of IT to the world of the disabled.

Linguistic Development.

In addition to the impact on expressive language skills recorded above, we have at present in Edinburgh a research project which will address the question of linguistic development among

deaf children using computers, turtles and "Visicom" in schools. It is too early to present definitive findings, but initial impressions with turtling are of greatly facilitated communication of concrete ideas, at all age levels, with an apparent capacity to "pass over" the need for a language medium and to get straight into the realm of concepts. This has proved particularly helpful with remedial pupils, whose language inabilities had been holding them back from the manipulation of ideas. In the "VISICOM" experiment, (not yet established) the school will be connected to a national network based on an electronic mail system such as Telecom Gold, with the BBC computer (Model B) as on-site medium. The aim of the project will be to teach children the use of the visual-telephone medium, along with an understanding of networks and handling of information, in a world where these are being used increasingly. This, along with the use of computerised iconic communication systems and the establishment of a video-dictionary on videodisk, will offer a level and constancy of linguistic stimulation which will, it is hoped, do much to counteract the effects of deafness, especially among very young children.

Other evaluative accounts of experiences using computer-assisted communication aids are still in preparation. The recently-established CALL Centre, a resource base for the region round the capital city, is amassing data and will publish case-studies towards the end of this year. Several other developments, of a technical nature, are being conducted but do not have the time nor the resources for formal evaluation. These include, in a hospital in Glasgow, the development of a speech synthesiser based on the patient's own design and established before he lost his own articulation; and at Dundee University, a visual communication aid for the disabled which adapts to the vocabulary of its user and offers optimised predictions in order to improve the efficiency of communication, together with a verbatim transcription and for the deaf for use at conferences and on live TV programmes.[I] All of these are at the prototype stage and are being evaluated technically as development proceeds. It is too soon, as yet to assess their experiential, or social, impact.

An evaluative group has been formed among blind users of communication aids and is now regularly offering advice and feedback to manufactureres and suppliers. It may well be a paradigm for future groups, including as it does representatives from twelve different occupations, degree-qualified persons on the Blind Register who use aids in employment with the approval and support of their employers.

SOME PARTICULAR PROBLEMS ENCOUNTERED.

There is a vast array of general problems associated with the introduction of communication aids to society at large, as with any technical innovation, and we will consider these in the following section. Here we address some of the particular problems encountered by the respondents, as they relate to the use of aids with specific handicaps. Consideration of these difficulties is presented in terms of type of handicap.

Problems for the Speech-Impaired.

The particularity of the needs of the speech-impaired is perhaps their greatest handicap. The reasons for the impairment are so varied, and yet so pertinent to their capacity to use communication aids, that the matching of aid to user requires to be virtually a one-off exercise every time. The type of input will depend on the residual skills of the user, and the type of output on the disability which he suffers, whether developmental, structural or neurological. Those who have language disorders (as distinct from articulation problems) are less likely to benefit from the use of a communication aid, although research into iconic systems such as Bliss-symbolics seem promising. It is also a simple truth, but one worth stating, that only those who are anxious to communicate will benefit from exposure to communication aids. Disabilities can cause atrophy of such motivation.

The subtle nature of communication offers a wide range of problems to the designer of an aid. Communication includes modalities

indicating mood, personality, geographical origins, class and status, all of which are important "signals" for the listener and for the effectiveness of the communication. If the "message" is reduced merely to the verbal content, delivered in a monotone, without the customary "fillers" of conversation ("uh-huh, "goodness!...", "oh really?"), the exchange inevitably seems unnatural, insufficient. Moreover, different output media - paper, screen, synthesised speech - condition both the meaning of the words and their reception. Paper is rather "official" contact; synthetic speech more "natural" and yet still lacking the subtleties of modality identified above. All aids, however realistic technically, are too limited in scope to meet the needs of the intellectually able but speech-impaired. The situation is further complicated by the fact that frequent re-assessment of needs is essential, since the impairment itself (whether from trauma such as a stroke, or from disease such as motor neuron disease) may show progression or deterioration, and do so at varying rates.[1]

The most common problem with communication aids, a is described by my respondents, is their slowness. While some form of communicatios is better than none, all aids lack the immediacy and spontaneity of speech, and the process of output is laborious for the listener as well as for the disabled person. It requires a tolerance which cannot be expected as a matter of course, and cuts the disabled off from 'everday' communication. As one disabled person herself described it: I cannot fall easily into conversation with strangers, even with my Lightwriter set up; often I find that people see the Lightwriter as a clever toy rather than my aid to communication. I ask a serious question and the person I am talking to will read it and say: 'Oh, isn't that clever' but sadly fail to see that it is me, not the machine, that is talking".[2] Not the least of the problems for the speech-impaired (and the disabled in general) is the need for a higher level of public awareness of their difficulties.

Secondly, privacy is a clear requirement in all one-to-one exchanges. Voice synthesis, however 'natural', currently rarely offers volume reduction in the way that a human voice can whisper, and it

may be that this problem for the speech-impaired is better solved by the silent LCD output, allthough slower. The opportunity to choose either, depending on the situation, would be welcome. Few machines offer both facilities at present.

Problems for Speech and Motor-Impaired.

Many diseases and disabilities affect both speech and motor capacity. Although this section is presented separately, all of the points made in the foregoing section apply equally here, but are compounded by the effects of lack of motor control which in turn leads to specialised problems for the user and for the designer of aids.

The specificity of need noted previously is even more marked with the multiply handicapped. Input devices must be uniquely tailored to the capability of the individual. For the person whose pointing ability is variable or inaccurate, an expanded keyboard may help; for those without the use of arms, a footpress may activate the input device; for the user paralysed from the nect down, inputs may range through forehead-pointing, chinpressing or other head movements, to the use of tongue, cheeks, grunts or suck-blow devices. The problems of assessment in matching need with capacity under such circumstances need not be enumerated, but involve medical diagnosis as well as paramedical expertise such as that of physiotheraty, speech therapy and possibly occupational therapy. Even when the input device has been carefully selected, portable enough to use in any situation in the street, in shops, in a doctor's surgery; but getting a device which is portable and yet has keys big enough to hit without difficulty is problematic. Keyboard design is far from perfect as yet. Moreover, even with a portable and easily usable device, there is no doubt that its use is tiring over any length of time, both because of the physical effort required to hit the keys (or press-pads, or touch-sensitive screen, or whatever) and because of the inter-

personal effort noted above to keep a conversation flowing naturally, apart from (or in spite of) the intrusive technological medium.

Finally, any device which entails the use of mouth contact or galvanic skin response is subject to the most stringent safety precautions, and the maintenance of these precautionary measures must be an ongoing problem for users and helpers.

Problems for the Blind and Partially Sighted.

It is argued that research into some of the primary causes of blindness (eg. Retinitis Pigmentosa which effects 1 in 2000 of the able bodied population) is itself in short supply, and that such preventative studies should take precedence over research into aids which are essentially palliative.

Leaving aside such policy judgements, it became apparent in the course of the interviews that obtaining information was a problem for most people. National networks, not always au fait with developments in communication aids, were struggling on voluntary finance; European networks to assist the disabled in pursuit of their career were, our partially-sighted university lecturer found, non-existent.

A whole host of remarks may be offered on the question of education and training. On the broad front, the practitioner may ask whether schools are creating unrealistic expectations in their pupils, by exposing them to learning through aids which will not be financially available when they leave school. Most teachers, however, see the benefits of early learning far outweighing such later constraints. It is the case, in general, that education and training in the use of aids has been lacking (in the U.K. at least), with the exception of Optacon. TSI offer an admirable two weeks' minimum intensive course to those beginning the use of Optacon; but for the teacher who is then given the task of transporting those skills back into the classroom, and of training children in turn, there are all sorts of difficulties of assessment, as one Optacon-trained Scottish teacher of the blind

discovered: there are differences in the ability, personality and motivation of the students, and the degree of supportiveness of their home backgrounds - which is important for the introduction of unsupervised practice. These are difficulties which perhaps face all teachers, but further particular problems present when it is found that individuals vary in their digital sensitivity to the stimulus (intensity and threshold are different for different people, and for the same people at different stages). Reading material cannot be standardised, but must reflect the age and interests of the reader; consequently "word per minute" measures, the standard by which it is possible to assess progress, are non-comparable between students, and only roughly so with any one student, since the measure does not take account of differences in text difficulty. The teacher is continually beset by lack of time for on-going appraisal of progress, unless such time is specifically built in to her timetable, and lack of continuity can be a problem if trained personnel leave (this shortcoming became poignantly evident, with the premature death of the teacher whose records I perushed and with whom I had discussed at some Length the use of the Optacon). For the blind pupil using Optacon, there are problems of transfer from a Braille-oriented environment to one of traditional orthography, and the machine is not easily integrated into the classroom because of an annoying buzz while it operates.

Finally, aspects of the hardware usage were problematic: the link-up of printer with Versabraille and Microwriter was not found to be easy for the blind; the Microwriter would benefit from a bleeper to indicate on-off state; the available software did not enable mathematical equations to be easily presented, using a VDU as an electronic blackboard; and above all, expense in the case of dedicated machines for the blind was prohibitive. As an example, the schoool-based Optacon cost, with peripherals, over UK £ 2,5oo (D.kr. 34.5oo ; Fr. 28.75o ; US $ 3.6oo).

Problems for the Deaf.

Our contact in Edinburgh has indicated some of the findings of a recent study on VISTEL, (an integral part of the VISICOM Project) a portable deaf communicating terminal (DCT) designed by the deaf to connect via the main telephone system with another VISTEL unit, or with any other DCT that meets the specifications laid down by British Telecom. It is also capable of communicating direct with any Prestel user who has a keyboard terminal facility. It offers aid for emergency services, calls to other deaf receivers, and a pre-recording facility via cassette for 1,000 characters or over (fewer than 1,000 can be stored in its memory). Unfortunately the standard model does not connect at the sender's end direct with micro or printer, and so it is not possible without a special interface to retain a hard copy of material sent to others. More importantly, its use has been found to be unrealiable because of "noise" on the line, due not to the machine itself but to the telephone network system. This may improve when the digital system is fully established. The VISICOM Project, funded by DTI, evaluated all new methods of typed telephone communication, including VISTEL and electronic mail. The VISICOM Report, about to be published, is likely to stress certain advantages of electronic mail (the system used was Dialcom, marketed in the UK as Telecom Gold). Electronic mail will link with any home computer with a modem, and will transit the message via the sender's computer such that he can take a copy, via the printer, of his outward correspondance. Costs are expected to be around £60 per annum for subscription charges but running costs (in addition) will be high since it takes very much longer to transmit information in this way. There is, at present, incompatibility with other European Deaf Telephone networks, and this is perhaps something to which the EC could turn its attention.

The use of communication aids with the deaf is not far advanced, and problems particular to this disability may not yet have surfaced. The lack of educational software specifically for the deaf has been a handicap to development, but in the UK is gradually being addressed by the Roston team in Hull and by deaf programmers who were involved in Visicom.

GENERAL PROBLEMS ACROSS ALL DISABILITIES.

While the problems identified below were itemised time and again in interviews, it is perhaps salutary to note here that not all users have difficulties, not all suppliers are at fault. Moreover, these difficulties are not unique to the handicapped; all innovations reach their target with difficulty.

Nevertheless the problems listed here represent areas for consideration important in the planning of the provision of aids.

For the Users of Communication Aids.

(a) the problem of getting adequate assessment of needs (in view of regional differences of provision, geographical difficulties of getting to assessment centres, inarticulacy due to disablement or social class grouping and professional disinterest)

(b) The problem of getting those needs clearly linked to a specific aid (in view of lack of knowledge among professionals; constant requirement of reappraisal of needs)

c) the problem of getting and updating information on aids (not all disabilities have a major national body which has the funds to provide this; much available information is nonspecific).

(d) the problem of getting objective evaluation of all aids (partly because of the particularity of disabilities, mainly because time is not always set aside for this service by the providers)

(e) the problem of getting demonstrations and hands- on experience (11 Aids Centres in UK serve a population of over 5o million, only 1 of these serves Scotlands's 5 million, despite distances of 4oo miles from the North to the Capital)

(f) the problem of getting funds for an aid (possibly less difficult if you are employed, in the UK at least; otherwise

voluntary effort is often the only source, as local authorities, who are not required to issue aids, are forced to make economies in their budgets)

(g) problems of getting training - both initial and continuing- in the use of the equipment, (partly due to lack of training of staff concerned, because Aids Centres cannot meet the training demands of such staff, and because of geographical problems of access as identified in (e))

(h) problems of time for familiarisation with hardware

(i) problems of maintenance of some hardware (especially for Scots, when manufactureres are in the south of England)

(j) problems of getting help, via support groups, to keep up motivation yet not lose independence (self help groups are just starting to emerge from among those who gather through national statutory or voluntary bodies, but need financial aid)

(k) problems of obtaining appropriate software for all hardware (a world-wide preoccupation at the moment, but the needs of the disabled are very specific and the capacity to 'make do' with something approximately useful is less than in ordinary educational circumstances).

For the Manufacturers of Communication Aids.

(a) problems of high initial development costs, but low returns of investment (because of the relatively small numbers of users involved)

(b) problems of high initial development costs but slow return on investment (because of users lacking information, finding fund-raising difficult)

Regional.

(a) problems of interdepartmental communication (eg hospitals with social work departments)

(b) problems of funding in contracting economies, with other claims on funds

(c) problems of establishing Resource Centres (not only with regard to funding but also to location and appropriate personnel)

Institutional.
(Centres)

(a) problems of getting funding

(b) problems of getting hardware, software and continuously updated information

(c) problems of issuing hardware, software and information

(d) problems of evaluating hardware, software and information

(e) problems of evaluating needs of clients, and matching to hardware

(f) problems of finding and keeping staff to fulfil the technical, informational and caring tasks of centres

(g) problems of time for training and information exchange

(Schools)
(a) problems of getting staff motivated to train in the use of aids

(b) problems of allowing time for staff to apply such skills to the training of others (fellow staff members as well as disabled pupils)

(c) problems of getting feedback on devices, to improve product (because users have unco-ordinated access to hardware and no support groups to feedback shared experience)

(d) problems of answering the technical requirements of devices (assessors of needs are scarce, being highly skilled and busy; technicians are not likely to meet them and are not attracted to carving out a career in this relativly small area)

(e) problems of lack of information in order to avoid duplication of design (on more than one occasion a major firm selling a well known electronic aid has threatened to sue companies which it considers are infringing patents by attempting to sell similar devices)

(f) problems of betting together appropriate development teams (which should consist not only of technical experts, but also neurologists, therapists, educationists)

For those who Administer the Distribution of Aids.

National.

(a) problems of apparent disparity of views between government departments

(b) problems of interdepartmental communication of intent (Health and Education, for instance)

(c) problems of communicating with voluntary bodies and local authorities

(d) problems of relying on voluntary bodies and local authorities for implementation

(e) problems of funding in contracting economies

(f) problems of getting ongoing evaluation of aids, to inform policy decisions

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(c) problems of retaining such staff (who tend to become experts in their own right and go off to staff resource centres)

(d) problems of finding staff skilled in the assessment of needs of the disabled, and able to articulate these to technical developers.

CONCLUSION - PLANNING FOR INNOVATION.

The problems reviewed in the previous sections are very varied and not always amenable to solution, nor to the same solutions. It does seem to be the case, however, that four key aspects emerge at all levels - lack of funds, lack of information, lack of infrastructure and lack of time.

While lack of money will always present a problem, the use of such finance as is available could be maximised by a degree of co-ordination. At present, similar services are being offered by different bodies using different sources of funding.

Information-gathering is a time-consuming and labour-intensive business. It seems sensible to ensure that information providers do not offer the same output and that all information sources are in touch and technically compatible with one another. The same notion of co-ordination will therefore apply.

The lack of infrastructure is evident at all levels. It is partly due to lack of funding but more seriously is caused by poor organisation. Official departements fail to communicate at national and regional levels; opportunities for co-operative development are lost, or are duplicated; sources of information although available, are not made accessible through official channels; and information is separate from training, which is separate from assessment of needs. Again the need for coordination is clamant.

Finally, time, like money, is always in short supply. Its best use depends on good organisation. Decisions and the essential

expenditures of time are a matter for national and local debate, but must be aided (as are the other three requirements above) by the establishment of:

resource centres
information databases
informal support groups/networks
the location of key personnel

Resource Centres.

There are in Britain at present 14 all-purpose Aids Centres, funded variously (4 by local health authorities; 3 by social service departments; 7 by voluntary organisations). Of these, 1 is in Scotland, located in Edinburgh. There are in addition 6 Communication Aids Centres, recently established throughout England by DHSS (Department of Health and Social Security) with funding from RADAR (Royal Association for Disability and Rehabilitation, an 'umbrella' organisation in the field of physical disability) and DTI (Department of Trade and Industry). Scotland does not as yet have one of this type, although a site in the West of Scotland was mooted. It does, however, have the CALL (Communication Aids for Learners in Lothian) Centre in the east of Scotland, funded jointly by Lothian Region, Urban Aid and DTI but only for the help of the communication-disabled in disadvantaged areas in the Region. Most of these centres offer information on aids, demonstration of some aids and some training of professional personnel who wish to familiarise themselves. The RADAR Centres also carry out assessment of needs and give advice accordingly. Of these Centres, only the CALL Centre, to my knowledge, undertakes directly research and development work in the field of communication aids.

There is evidence (from the Newcastle Aids Centre and the CALL Centre in Edinburgh) that most of the visitors to aids centres are from the surrounding geographical area; in the case of the former, this has been so even though its official remit was for a much wider spread. Because of the logistics of access, it would seem that there is an optimal distance beyond which potential users will not travel. There is probably a maximum catchment size, too: Christine

Tarling of the Newcastle Aids Centre suggested at a recent conference that this was likely to be 1.5 million of population (but that is for all aids for the disabled, not just commununication aids).

Different views are expressed as to the function of resource centres. Should they attempt development of aids as well as their demonstration? Should their staff encourage liaison with local industry? Can they offer training for needs without assessment of these needs? The answers to these questions will determine the make-up of the teams staffing such centres.

Moreover, the balance between 'local' information and 'national' must be considered: how can local centres best supplement (or complement) large national bodies?

Information Databases.

Scotland is fortunate in having attracted DTI money for the establishment in Glasgow of the Special Educational Needs Information Exchange project, a development project which will establish a database of information on many aspects of disability, including a catalogue of available software for special needs, a comprehensive survey of related research and development in the country and a list of helping bodies, locally and nationally. The aspect which is, I think, of most interest is that it is interactive, since its recipients/contributors will be on-line to it and can offer as well as receive data. Thus information can be constantly updated and evaluations conducted at source, with the Information Exchange acting, as it were, merely as a clearing-house. Its 40 information points are to be located throughout the contry, initially primarily in educational establishments, although some clinics and local centres (research or community) will also be connected. Its Advisory Committee is a sub-group of a larger inter-professional body which seeks to reflect the interests of the local authorities as well as of the caring professions.

At the same time many other such sources of information are springing up, in UK as a whole: the Prestel Disability Database;

BARD (British Database on Research into Aids for the Disabled; DEARS (Disability, Electronic Aids, Reference Service); HPRU (Handicapped Persons Research Unit); the SEMERCs (Special Education Microelectronics Resource Centres); as well as the national bodies devoted to the interest of specific handicaps such as the Royal National Institute for the Deaf, the Society for the Blind in Scotland and the Spastics Society. RADAR (the Royal Association for Disability & Rehabilitation) claims to coordinate the efforts of over 3oo voluntary and statutory bodies working for

the welfare and rehabilitation of disabled people. The amount of information involved quickly becomes unmanageable unless networked electronically from a very well-constructed central base.

Informal Support Groups/Networks.

Although national organisations do much to inform and aid, the disabled individualoften finds himself forced to rely on local groups for ongoing help. Few parent organisations deliberately encourage such neighbourhood activity - it usually just evolves, brough on by mutual need and common interest. Nevertheless it is just such support which is vulnerable to lack of funding for newsletters or non-availability of a meeting-place. Several solutions suggest themselves. Resource centres can make their premises available to such group (the CALL Centre in Edinburgh opens its doors regularly to three such groups). News can be disseminated to some extent via information exchanges. And hospitals (where disabilities are first identified) could do more to promote and locate local networks for people with specific disabilities, putting them in touch with local or regional resource centres and maintaining awareness of what type of support is available.

Key Personnel.

Informally, such people tend to be identified by members of local networks and suppor' groups, in a process which becomes selv-perpetuating. Formally, there is room for improvement. Frequently, staff in one type of centre do not know of those on other local

sites and cannot refer the disabled client to the appropriate key person. More understandably, formal or professional helpers are simply unaware of informal networks and fail through ignorance to forge crucial links for the handicapped in need.

It is suggested that Scotland, with its manageable size of population, is at this moment evolving a structure which will help in the identification of key people by the establishment of a national SIG (Special Interest Group) with active links with local SIGs[3]. The national group comprises representatives from speech therapy, educational psychology, the CALL Centre, the University sector, a college of education, the Scottish Education Department (research), the Inspectorate, the Scottish Microelectronics Development Programme and the Scottish Council for Educational Technology. Others are expected to join it from local authority social work departments and from the national occupational therapy association. The first local SIG group to be formed (in Lothian Region) will also send a representative to the national body, for information and mutual aid. It is hoped that other regions will follow suit. As yet the pattern is personal and relatively unstructured. A degree of formality (but not, it is hoped, rigidity) may be required in the future, insofar as it may be necessary in order for all associates to present viewpoints at meetings. Its strength is that it will speak as one voice on behalf of the disabled, young and old, to those in authority responsible for decision-making.

These four elements (resource centres, information databases, local networks and key personnel) are not, of course, of themselves sufficient to create innovation. I would suggest, however, that without them it would be almost impossible to promote change, innovation and development for the disabled. Just as importantly, with them it is likelier that the results of present labour will be more fully exploited and that planning for the future will be better informed.

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NOTES.

1. For fuller discussions, see papers by A.F. Newell and J.L. Arnott et al in forthcoming Second International Conference on Rehabilitation Engineering, Ottawa, June 1984

2. Joanna Austen, quoted in "Learning to Cope" 1983

3. This use of the acronym MSC is not to be confused with the Sheltered Industrial Groups, (SIGs) run by the local authorities with funding from MSC

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Computer Based Communication Aids for Non-Vocal Handicapped Persons

Experiences and Perspectives in The French Rehabiliation Center of Kerpape

André Sylvestre, Lorient, France.

..."I get up set when I realize we can put men on the moon and talk with them from earth millions of miles away; but people right here have been robbed of the gift of speech. And it is a gift. We should use space age technology to help people to communicate with each other. When we help non-verbal people to communicate in a acceptable manner then we can go to the moom or whatever. Note I said when, not if. The technology is here. We must change our priorities".

Jim Brooks

Jim Brooks used his wheelchair portable communication system to give this following speech at the second annual interagency conference on rehabilitation engineering.

August, 25.-3, 1979 in Atlanta, Ga, U.S.A.

I. - REHABILITATION CENTER OF KERPAPE.

- Making recent technological development available for persons who experience severe handicap becomes a major preoccupation for a lot of professionnals in rehabilitation field.

- It's one of the objectives of the rehabilitation center of Kerpape, which encourage, for ten years, applications of new technology to improve the quality of life of physically handicapped individuals.

- This center, one of the most modern and important in Europe, is situated near the sea in Brittany and treats 400 patients each day (4000 each year), of all ages and all motor handicaps resulting from a accident, a neurological or neuromuscular dysfonction, or a neonatal brain damage.

- Pilot hospital for its care services, it's also both a tool of thinking and action for the social, professional and emotional outcome of these physically handicapped persons, and a means of stimulating a change of mentalities and perspectives.

- To demonstrate this approach, the center of Kerpape is developing an innovative and multidisciplinary project entitled: Project F. U. T. U. R . HA.

II. - PROJECT F.U.T.U.R.HA./NEW TECHNOLOGY IN REHABILITATION.

Project F.U.T.U.R.HA. (Projet visant a Favoriser L'Utilisation des Technologies nouvelles pour un Usage Reeducatif au benefice des personnes HAndicapees) began March 1978 by a trip to North America to collect information on new developments in communication aids for non-vocal people (principally cerebral palsied children).

This project, through limited at the beginning in the choice of patiens and in the professional number involved (essentually therapists and teachers) is growing each year: actually, 150 patients

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participate directly in FUTURHA and a team of rehabilitation engineers and computer professionals complete the initial project staff.

The major objectives of F.U.T.U.R.HA. are to focus the power of new technologies to help meet the need of persons with severe motor handicap (sometimes without speech), and can be summarised like this:

1. Designing and adapting assistive materials for such a population to increase its independance in communication, environmental control and ambulatory autonomy . Services include assessment, equipment evaluation, equipment fabrication and modification, and training in the use of these technical aids.

2. Promoting new teaching on rehabilitation activities with aid of advanced technology (for ex. computer basedlearning environment for non-vocal C.P. children or computer based cognitive rehabilitation for braininjured people).

3. Facilitating transfer of these applications and exploring the use of these devices, in the home and community. (A special program will be developed which will indicate how technology can best be applied in order to effectively support the full integration of persons with motor handicap).

4. Analysing conditions of rejection or acceptance of technology applications by users themselves, but also by those in the institutional and external environment.

A great part of this project is consequently concerned with notions of computer based communication aids.

III. - COMPUTER BASED COMMUNICATION AIDS FOR NON-VOCAL MOTOR HANDICAPPED PEOPLE.

Ability to communicate is basic to human development and interaction, and speech is certainly the most natural form of human communication. However, many handicapped individuals are not successful with conventional speech and get frustrated if they can't relate and exchange thoughts, feelings, needs.... with others.

In the two last decades, alternative communication aids have been developed or adapted to assist such a population particularly non-speaking motor handicapped (as many cerebral palsied persons): at first with limited pictographic systems or much slower word spelling techniques and, more recently, with voice out-put electronics devices or micro computers. Now technology permits these non-vocal children or adults to sample the fruits of vocal communication for the first time in their life.

As Paul Goldenberg notes in his book: Special Technology for Special Children:" The computer provides a flexible technology that can so throughly enrich the experiences and communication of certain handicapped persons that activities and learning that were previously thought impossible for them become routine and easy. By facilitating communication and activity for these persons, this technology provides a window into their mind that radically changes the picture we, and they have of their abilities".

SOME HISTORICAL REMARKS.

For this author, the application of electronic technology to aid communication for the severely handicapped person is not, relative to the technology itself, a new idea. Electronic communication aids for the physically handicapped have been reported as far as 1957 (Lavoy) and continue to appear sporadically in the litterature during two decades. The best reference of this, citing a wide variety of these devices are:

KAFAFIAN (1973)
VANDERHEIDEN & GRILLEY (1976)
VANDERHEIDEN (1978).

Goldenberg continues so: "Despite the availability, variety and power of these devices, and despite the age of some of them they are not yet well known or widely used.... It is disappointing but not surprising to note that little word of existing applications of technology has filtered into the standard texts. The existence of a field devoted to electronic aids for the handicapped is so new that communication, even among the concerned professionals, still tends to be sluggish and spotty". For Nye (1973), the reason is the complexity of some of the tasks for which these devices are designed is too often...overlooked or underestimated and many devices make demands on the skills of the uses which go well beyond his ability to respond. In facto the computer must be fairly flexible if it is to provide full communication for severely physically impaired people.

However, in some areas of the field, communication is improving: Specialized reviews (as Communication Out look...) and reports (as ICTA : Technical Aids for the Speech Impaired) are published, in 1978, congresses (as annual conference on systems and devices for the disabled) were organized the same year.

The French applications.

In France, concrete experiences with electronic communication aids for non speaking and/or physically handicapped persons began approximately in 1975, by the use of the first generation material of CARBA, POSSUM or P.M.C. (essentially electronic typewriter, assisted with pageturner, environmental control, designer, phone). There are restrictions to full use, principally the necessity of spelling competence. Different portable communicators (as CANNON, ELKOMI...) are available but not scanning communication boards and all the material from foreign countries are custom-designed.

After, an interesting but limited commercial attempt by CARBA at a multifunction center (pre-programmed software: writing, drawing, music, scanning), the beginning of the 80's saw the advent of micro-computers and voice synthetizers which have provided a new perspective for the rehabilitation field.

For Gregg Vanderheiden (1981): "Although there are many situations in which micro-computers are not applicable, they can provide flexible cost-effective solutions to a wide range of problems faced by handicapped individuals. Because of wide spread availability and support, the more popular micro-computers offer certain advantages such as ease of discrimination, over custom-designed aids. They can also reduce one of the biggest problems in the area of rehabilitation, maintenance *and repair*. Actually, design and adaptation of such devices has seen an exciting expansion principally in North America. In France,during the two last years, the interest for this field has been growing. Development of specialized hardware and software was slow but is now becoming dynamic with the support of industry and the research ministry. Special commissions are developing listings and evaluation of materials and organisation of different teams, for collaboration and exchange.

We present some of the actual experiences realised in the rehabilitation center of Kerpape, to promote use of computer based communication aids, principially with non-speaking cerebral palsied persons. These experiments include:

Assessing and training motor capacities of non-vocal C.P. individuals to determine the appropriate interface to their communication system.

Using micro-computer for evaluation and learning of graphics communication codes (with or without vocal output). For example: the use of Bliss software) (Bliss Apple of Trace Center - Bliss board - Bliss drills and Bliss concepts of M.E.C.C.), of par le si la b software, of text editor...

Developing portable scanning electronic boards with memories and different formats, attach to wheelchairs to facilitate the communication process.

Evaluating French portable speech prosthesies.

- Syngho. An economic portable VOCA (voice output communication

aid) - A text to speech syntheizer with 64 units: Phonemes, syllables or phrases - created in Kerpape.

- SPARTE, , at transportable text to speech synthesizer which features high fidelity voice quality, unlimited vocabularly and authomatic inflection control. Some adaptations were realized in Kerpape.

- SAHARA II, A Bliss talker of 486 cases activated by one switch. The synthesis system software includes a grammar allowing the transformation of a series of selected squares into a syntactical correct sentence and a systematic inflection processing as a means of improving the quality.

- PAR LE SI LA B II TALKER (under development) a portable voce inspired by the Cheryl Goodenough-Trepagnier system based on Syllabic method. The original system consists of a Matrix display of 288 syllables, phonemes and number. In our version, this is restricted to 160 syllabes and add contextual phrases.

All these applications involve the evaluation of non vocal physical handicapped persons (child or adult) ot attempt to find the most efficient form of communication for a particular child, in term of his intellectual, physical and psychological capacities.

PERSPECTIVES.

Actually, technology seems to "invade" the rehabilitation field particularly in the area of computer based communication aids. The development of adapted devices grows each day (we present some recent realisations in sophisticated communication aids coming principally from USA (for ex: Scan writter, personal computer, Mark II, Special Friend....) but it's not easy for professionals to collect information. Thus, it is essential to suggest the concretization of the next options

to facilitate European cooperation in the field of communication aids

to promote the exchange of information and workers between the countries involved,

to stimulate research and realisations programs,

to provide a forum for discussion on communication aids,

to compile information on research in each
and disseminate the knowledge by means of an international informations bank.

What Can We Use Microcomputers For in The School?

Christian Wang, Denmark.

During the next few years, thousands of microcomputers will be purchased by schools throughout the country. Another technical aid among the many we already have: film projectors, video-recorders, magnetic tape recorders, overhead projectors, stereo equipment, polaroid cameras, copying equipment etc.

Quite apart from computer instruction, can computers be used at all in ways that are justifiable in pedagogical terms.

Attempts to deal with this issue can be made, of course, on basis of all the activities taking place in the schools already, i.e. all the activities performed by the pupils, hence also on basis of all the material we use in our teaching.

All these activities cannot be classified. More than one have tried, but so far I have not seen it done in what I deem a useful way. Teaching materials, however, have been classified. The decimal classification system in the school library and in the teaching aid centres constitutes a classification. It is based on subjects and related topics. In times with spreading subject integration (as I am happy to note) the teaching aid centres distribute small publications designed to assist the teachers pick the relevant materials, often despite the decimal classification system.

For the purpose of evaluating the applications of microcomputers, a description of the activities and teaching materials of the school is required; not a classification, but a description of the spectrum of activities making up a schoolday.

When I use the term "spectrum", it is because I believe we can describe the teaching activities by means of two extreme points: On the one hand:

- activities aiming at increasing the volume of the children's SPECIFIC skills and knowledge.

On the other hand:

- activities aiming at increasing the children's GENERAL opportunities of fulfilment.

We can do without neither of those two forms of activities in the schools. One is not "better" than the other. On the contrary, it is safe to say that any pedagogically appropriate teaching process must encompass elements from many parts of the spectrum.

- Someone playing the piano must do a lot of practicing before being able to improvise.
- Someone wanting to make a bookcase must learn in the first place how to use the various tools - and then some theoretical knowledge about materials, joints and finish is useful too.
- Someone wanting to make a painting must master some techniques and know something about perspective, colour effects etc.
- Someone wanting to become an actor must be able to use his body and the spoken language in a conscious way and must also know some drama techniques.
- Someone wanting to write a poem or a short story must master some of the effects of written language - and must quite basically be able to write.
- One must crawl before one can walk.

If the children are to have the opportunity to expand and fulfil themselves at school, they have necessarily to acquire a certain foundation of specific skills and knowledge.

From my point of view these two forms of activity can be described by the following keywords:

practice	play
train	experiment
closed	open
convergent	divergent
competition	cooperation
problem solving	problem creating
fixed	flexible
error = negative	error = positive
specific knowledge	general concepts and principles
specific skills	general strategies
finished programmes	programming language and games

Elaboration on the various keywords:

PRACTICE/PLAY: Small children practice all the time while they play. They practice over and over again - they seem to love repetition; and they get better, of course, in no time. When they play with others, it is typical that they often change the "rules" of the game. When the adults do not interfere, the children see to it themselves that the game offers appropriate challenges of suitable difficulty.

TRAIN/EXPERIMENT:

"Training" seems a more purposeful activity than "practising". When one trains, one does so because one has a certain aim to attain - and fast. Similarly, "experimenting" is a more purposeful activity than playing.

CLOSED/OPEN:

When someone trains, one's behaviour is closed in the sense that one "concentrates on the task" - shutting out all disburbances, so to speak. When experimenting, however, one is often bound to be open to thoughts and ideas from outside if the experiments are to lead to something useful that can bring one forward.

CONVERGENT/DIVERGENT:

These terms cover almost the same as above. Divergent is to many people a better word than loaded "creative". In a convergent activity, the teachers' replies for instance will differ considerably from the ones in a divergent activity. I will quote an example from woodwork instruction:

Convergent: The pupils are given some sheets of paper with a drawing of a small table. Also indicated are measurements, materials required and assembling techniques together with "building instructions". If/when the pupils run into problems in the process and ask questions of the teacher, the reply comes from a walking authority who knows all about small tables, materials, assembling techniques, work operations etc. Do it this way! All tasks are proposed by the teacher - the activities are primarily convergent.

Divergent: A group of pupils want to make a small table. How do we go about that? It is now up to the teacher to ask counter-questions of the pupils like e.g.: What purpose will the table serve? Will it be a working desk? What kind of drawer? What should it be made of? How can/will you assemble it? Should it be painted, or what? Do you want to make a small model first. Etc. In this case the teacher's role is different! "Let's see if we can find out together! " Because the pupils are to be forced to make these considerations themselves, and they are to use their theoretical knowledge to form basis of all the small decisions they have to make during the work. Both main task and partial tasks are defined by the pupils themselves - the activities are primarily divergent.

COMPETITION/COOPERATION:

Training activities lead to competition. We know that - it is hard to avoid. The experimenting activities, by contrast, invite cooperation. Many experiments can only be made through a cooperation with others - pupils and teachers.

PROBLEM SOLVING/PROBLEM CREATING:

When the pupils are training, the activities almost always consist of problems that they have not defined themselves, (e.g. numeral training, spelling exercises etc.). This may be one of the reasons why it is difficult for the pupils to muster any great interest in the matter. When the pupils are afforded the opportunity to play and experiment with suitable materials, they create new great and small problems for themselves all the time. "When it is possible to do this, couldn't I then just do like this instead?" The pupils will often be extremely interested in solving problems they have created and had a chance to influence themselves.

FIXED/FLEXIBLE:

Teaching materials available for training purposes are usually fixed programmes, sometimes with small ramifications where the author has anticipated (or tried to anticipate) how the pupil, the user, will behave underway. Normally, the pupil himself has no influence on the training programme. Teaching materials for games and experiments, by contrast, must be designed in such a way that they constitute an open offer to the pupils. It is up to the pupils to decide what is going to happen. The benefit of the programme is the pupils' mutual discussions in which ideas and arguments are put to the test, rather than the resulting physical product.

POSITIVE AND NEGATIVE ERRORS.

In a training programme, errors are something which must be avoided. Errors are conceived by the pupils as something negative. In this type of activity errors contribute to sorting the pupils. But when the pupils get the opportunity to participate in various games and experiments, errors occurred are not conceived as something negative in the way it was before. In pedagogical terms the errors can be characterized as something positive in the sense that they often occation invalidation of assumptions or theories and act as incentives for further experiments.

SPECIFIC KNOWLEDGE AND SKILLS
GENERAL CONCEPTS ,PRINCIPLES AND STRATEGIES:

When the children perform convergent activities they acquire knowledge and skills that are associated with specific contexts. By and large, the knowledge can be put to use only in situations that are very similar to the one in which the teaching took place.

On the other hand, when the children perform divergent activities the number of situations grows in which they can take advantage of and use the knowledge and skills they have acquired. It seems to be a fact that the children learn to use concepts, principles and solution strategies in a meaningful way in various contexts.

The link between the two types of activities thus consists of the process (in the divergent activities) in which previously acquired knowledge and skills are used in new contexts; this must be the objective in large parts of our primary and lower secondary education.

Throughout an entire school career the pupils spend their time primarily on convergent activities (left side of the listing); in fact, in special education, i.e. the teaching of pupils with specific learning problems, so to speak all activities are convergent. Several reasons could be quoted for this, e.g.: 1) Only a small amount of teaching materials introduce divergent activities (right side of listing). 2) The school has to operate under tight economic conditions. 3) Demands on the part of pupils/parents that the children should qualify for future permanent jobs. The final tests certainly come into this context, too. Perhaps the lack of interest in the school evidenced by the older pupils is, in fact, also attributable to the excessive emphasis on convergent activities.

READY-MADE PROGRAMMES
PROGRAMMING LANGUAGE AND GAMES:

So far, microcomputers have (still apart from computer instruction) primarily been in use for convergent activities (app. 95 pc according to the Ministry of Education) such as EDP programmes affording the pupils the opportunity to train on a specific topic, often individually. This tends to show that microcomputers, so far, have only been used to strengthen the already predominant convergent activities in the school. This, of course, is quite all right. One has to start somewhere. But somehow it does seem reactionary for new technology - in this case the microcomputers - to be used primarily to solve problems that are in a certain sense "old".

Why does nobody in Denmark inquire into the question whether the microcomputers could contribute to a pedagogical renewal of the schoolday - to the solution of pedagogical problems that we have not yet been able to solve adequately otherwise? E.g. that the pupils should have much more opportunity that they have now to join in divergent activities where playing and experimenting in cooperation with others are predominant features. Instead of using new technology to support old forms of activity, why not use it to support the development of new divergent, hence creative, activities that are urgently needed in our future school.

The LOGO educational material is a case in point.

It could be claimed, by and large, that the ready-made programmes of the microcomputers, e.g. the training and test programmes, only offer opportunities for convergent pupil activities, whereas programming language, e.g. of the LOGO type, offers opportunities for divergent pupil activities. If ready-made programmes are to introduce divergent activities in any case, their design should be so flexible that the pupils were able to change the course of the programme while progressing, change the "rules" applying to the "game". To my best judgment we can use the principles of some of the best pedagogical games available, in this context.

Some examples:

CHEMISTRY:

When chemicals react with each other, this occurs in accordance with some relatively well-defined principles and rules. A computerbased programming language/game might afford the pupils the opportunity to copy chemical experiments (something that requires knowledge about chemistry). This, in ifself, is not very interesting. What is exciting, however, in pedagogical terms is that the children get the opportunity to change some of the rules applying to chemical reactions and then perform new experiments to see what happens. In this way the children get insight in the role of the various rules of chemistry when operating with chemical reactions (atomic weight, ions, valence, equilibrium, acidity etc.).

MUSIC:

Music is a socalled creative subject. If the pupils are to try their hand at composing and playing, at least two things are required.

First, they must be able to read music, and, secondly, they must be able to play one or several instruments. This, I suppose, is the main reason why it is hardly ever possible to us as teachers to carry out an education involving the children in composing and playing their own music. In this, the new technology may be able to help us. We need a computer-based system where the children can key in notes (plus all the elementary symbols such as key signatures, rests, figurations etc) in several parts. Subsequently, they can reproduce the music by means of a musicbox which is connected to the microcomputer. "Try and key in some notes and listen to afterwards how it sounds. If you do not think it sounds right, you can change the notes at your will. Go on, until you think it sounds good".

In this manner, the children can program piano, guitar, bass,

drums, etc. just the way they want. I.e. They can experiment with the connection between notes and the actual sound impression of these notes. They will get acquanted with some of the theoretical Principeles of music without necessarily being able to read music or to play an instrument beforehand. This, of course, is a far cry from the sound impression created by a real orchestra and a synthesizer. The idea is not, in fact, to mechanize real music, but rather to afford the opportunity for the children to experiment with music on their own.

My conclusion is that we should try to reach a situation in which the use of microcomputers in education introduces divergent pupil activities to a much larger extent than is the case at present. I have not doubt that pedagogical programming language and games can contribute to afford the children a better opportunity to perform divergent activities - hence fulfilling themselves. It is my hope that the microcomputers will thus be used in a appropriate way from a pedagogical viewpoint in our future school.

Use of Computers in Special Schools Report on Experience in The Classroom

Paul Murphy, Manchester, United Kingdom.

Introduction.

In this paper I shall attempt to represent the work and views of a group of teachers in the City of Manchester who are keen to develop micro technology as a positive teaching/learning resource for the handicapped. Not because they see the technology as a way to simplify or replace their role as teachers but because they believe that by using the technology the communications barrier between the handicapped and the educator can, to some extent, be bridged. In fact, the implications are considerable in terms of additional preparation and production of relevant materials. The bonus is recognised to be that opportunities for the pupil to learn and enjoy leisure are increased. The skills of the teacher will be engaged in identifying the nature of the individual needs of a pupil. These could be in the first instance communications, but of greater relevance the appropriate learning/teaching strategy for that child. Decisions can then be made regarding the nature of the hardware/software interface that could meet those needs most effectively. Once the communications barrier is bridged the latent skills/potentiallities of the pupil which have so far been untaped can be assessed. The aim should be to allow the pupil to develop all their innate faculties/skills to make contact with the greater world of learning and to have a greater participation in society in the form of either leisure, aesthetic experience or useful employment. In addition, children in the Special Sector should have equal rights with their peers in mainstream education to participate in all the experiences and opportunities the new technology offers.

It is the view of our Group that, for the moment, we are only touching the tip of the iceberg of the possible; that we are still very much in a pioneering situation, and that the methods used should remain under careful scrutiny. We are still very much at the lower section of a learning curve. The areas of classroom developments, pupil expectations and staff professional development still require considerable investigation, not in the light of established principles but of evolving ones.

Historical Note.

In the context of a forward moving and rapidly developing involvement, it may seem out of place to examine a history of developments. Particularly that of a single project when so many others are taking shape. However, we believe that the underlying objectives and principles of the one project and the questions raised during its past and present evolution are likely to be common to the whole area of Special Education. These relate to the fundamental role of any resource acting along side the trained teacher in the classroom.

Uses of micro computers for the education of the handicapped in Manchester dates from 1979. During the Autumn of 1979 a feasibility case study was mounted to determine whether a micro computer based system could be effective in the teaching of children with severe communication difficulties. The particular case study examined the application to a child, in the Lancasterian School, Manchester, suffering from severe physical handicaps. He has no potential for consistent limb control, not speach and only sufficient muscular control to operate one on/off switch at a time with the side of his head. Communications with him had been affected by eye pointing, the intuition of the teacher and anticipation of likely needs. Initially the Bliss Symbolic System was used with the child but was inadequate for him to achieve his full potential. The system had its own limitations as well as being limited as an educational resource. It was, however, possible to identify his capabilities at word recognition and reading. In real terms it was not possible to assess his actual intelligence as normal techniques take performance into account. Given the existing systems a performance

reflecting his true innate abilities was impossible to measure. Consequently it was impossible to establish a meaningful measure of his actual mental capacity.

Following an initiative from a speach therapist at the school, tutors from the City of Manchester College for Higher Education (now amalgamated with Manchester Polytechnic) co-operated with many of the staff in the school. They adapted a Commodore micro computer to be controlled by a single switch. The adapted machine was taken into the School together with software specially written by students in the College. This included games under switch control, cursor control tests and simple Possum type programs. The early trials were successful in showing that the micro computer could play a valuable communications role between the child and the teacher with potential to contribute to his education.

Following the success of the feasibility study a College tutor was given time to pilot and develop the project further. Particularly essential was the wider development of the software and interfaces. To arrive at a version that was both pupil and teacher friendly, took many visits by the tutors and many changes to the specifications. The context of the visits was debate, assessment and evaluation by the teacher with the tutor. Gradually the system began to play a significant role in the actual education of the pupil. The child was free to work and has access to the new environment which offers methods for recording and retrieving his work. He has the opportunity to build words, to access and use language, aquire a perception of sound and sequencing of sound relating to language. It became clear that his word recognition skills (as indicated by Bliss) were not as advanced as thought. His receptive language was also found to be in advance of his expressive language. Consequently it is now possible to be more specific about his special needs.

The name of the software package is 'Disc Words' and it is content free. It provides for the teacher, the equivalent of a blank word book into which can be fed structured learning material. The pupil can then access this material to reinforce and practice the skills using the facilities of the computer after traditional teaching methods. It is important to emphasise that the machine is not

being used as a teaching device. The package enables the pupil to move letters, words and numbers around. The package treats the contents entered by the teacher as blocks and the pupil, in effect, is only moving blocks of things around. By moving letters he can make words, by moving words he can make text and by moving shapes he can create pictures. He can set up his own data, store it and print it out on a printer if required. The end result is that the pupils has an exercise book like the other pupils and consequently moving towards greater normalisation. Later stages of development enables the pupils to create pictures using graphical design techniques and reproduce them on the printer.

The system put the pupil not only into communication with the teacher but also with other members of his peer group. Games adapted to run under switch and keyboard control also enabled the pupil to participate in games with other pupils hence sharing and being in social communication. Not only has the system broken a communications barrier but also a social one. The pupil (and others) are now more fully integrated in their peer group than was previously possible. Previously it was a distinct and limited relationship between the pupil, the teacher and the school. The machine provides the pupil with an opportunity to interact more with his environment. He has an opportunity to socialise and explore which opens up whole new areas for his personal development. However, to what extent he is capable of benefiting from a more formal education, or developing the skills of investigation, selective decision making and original thought are still outstanding questions.

At a later stage a simple program was devised in the school that enabled pupils with sight deficiency to produ : words at large character format on the screen and printer.

Several pupils with different levels and types of handicap have benifitted from the package. Dependent on their level of motor-control they are able to use switches, joy sticks or the keyboard. What is apparent is that previously children were 'acted upon' by the various support agencies. To some extent the pupil has

become an 'actor' himself within the school. Able to play a role both in terms of his own development and self-expression.

Care must be taken that the machine does not become an all pervading, pre-occupying end, but that it is only a means to an end. Enthusiasme should be for the achievement of the pupils not for the utilisation/adaptation of technology. Previously the relationship in the school for the pupil was one to one with the teacher. Poor planning could lead to this relationship being one to one with a machine!

It is one thing pioneering an innovation, it is another to extend its use. Recognising the value of the work being done at the Lancasterian we were keen to see it extended to other schools for the physically handicapped. Questions of acceptability and portability had to examined. In practice the system was readily usable by teachers with different experience and with a variety of pupils in different classroom conditions. However, it is the case that the quality of the pupil performance is dependant on the quality of the material he is presented with. As yet there is still limited experience in use of the technology to be aware of its full implications for the teacher. The consequencies for teacher education at both the in- and pre-service levels does need to be examined closely.

In 1982 the Department of Industry gave us a grant to undertake the translation of the package to the BBC/ACORN micro computer. This presented an opportunity to modify and enchance the Commodore based package as well as transcribing the package. The superior facilities offered by the BBC/ACORN micro computer has also led to a vastly superior version of the system. Of considerable value has been the involvement of staff from a local computer firm (Ferranti Ltd.) on a voluntary basis in producing special modules for the package.

L.E.A. Support for Computer Developments.

The support structure for computer based education in general for the City of Manchester consists of a full time group of five (ex)

teachers. They are working with groups of teachers from, in the main, Primary and Secondary school to produce classroom material for the micro computers. As well, a part time group is linked with them to support school timetabling. The Authority has its own trained technicians to maintain the large amount of computer equipment in the schools. There is now a growing involvement of all these people in supporting special schools.

LEA Working Party - Special Education.

To ensure adequate support for the Lancasterian itself and to the other special schools, we established an Authority based Working Party. The initial brief of this group was to examine the implications of the packages developed at the Lancasterian and to assess the wider use of the micro computer as a communications device for the handicapped.

Since then the use of the micro computer has spread to the schools for the visually impaired, the hearing impaired and children with severe learning difficulties. Each with a different view (summarised below) of how to use the technology for individual pupils.

There is a growing body of computer software purportedly for Special Education. We attempt to assess and disseminate where practical. Much is unsound from the point of view of the program and much on educational grounds. However, the preparation of good material is a time consuming and costly process. Consequently any material found outside the Authority requires examination. There is still a tendency for the pace to be dictated by the computer enthusiast instead of the educationalist.

We have 35 Special Schools in Manchester. Schools for the physically handicapped the visually and hearing impaired; those with severe learning difficulties and the socially and emotionally disturbed, as well as education integrated into mainstream education. Only those with profound disabilities are in the special schools. There are practical links between Special Schools and both mainstream schools and Colleges for Further Education.

Many of the Special Schools are interested in exploring the use of the micro computer and micro electronics as a resource for both communications with pupils and reinforcement of learning. However, it is the concern of the Authority that involvement has a sound educational basis. To support this concern all types of schools are represented on the Working Party as well as other support agencies such as the Special Education Resource and Information Unit, the national Special Education Resource Centre (SEMERC), Further Education, the Inspectorate and the Micro Electronics Developments Group. A teacher from the Lancasterian School is released from timetable 2 days a week to support the introduction of computers in Special Schools.

To summarise, the role of the group is to:

a) monitor and communicate developments in the use of computers across the sector,

b) identify current concerns regarding the use of computers in the special field,

c) examine the support structure,

d) identify the In-Service Training needs of staff in special schools,

e) evaluate currently available software,

f) act as a forum to feed back interests to the LEA Advisory Committee for Micro Electronics.

Use in different Schools.

(1) The Physically Handicapped.

Using a variety of interfaces/switches children in 3 schools are using Disc Words, graphics packages, concept keyboards and reinforcement packages.

(2) Visually impaired

A large character program enables children with partial sight to create and edit text. The school is also investigating using visual tracking games with the younger children and interfacing Braille equipment to the micro computer. The school has a former systems analyst on the staff doing much of the work.

(3) Hearing Impaired.

A wide range of computer assisted learning packages are being used. Computer studies as a subject is being taught. A program and interface are being developed to assist in the teaching of sound in science. A teacher at the school is doing an M.Sc. in science education, computing forming a large part of this.

(4) Severe Learning Difficulties.

Programs and interfaces are being used that monitor progress, produce reward responses and give basic education re-inforcement. Using concept keyboards pupils are given basic skills training. Two schools are using these methods, others are interested.

One school is particularly interested in the record keeping aspects of a computer. Wishing to maintain a running record of pupils progress through a personalised and structured curriculum. Progress is slow on this as we are seeking to arrive at a balance between what can be achieved using a standard data-base program and a complicated purpose written program.

(5) Hospital Schools.

Most units are now using computers for basic computer assisted learning in different subject areas.

Summary.

Essential principles are that the equipment in use should be in standard use and readily available. The software sould be easy to use. Equipment should be safe and reliable. Many groups have sought to develop custom built hardware. This is inefficient and is open to abuse by ad hoc administration. The hardware itself should be as simple and easy to use as possible and ideally from an existing standard range. Specialised hardware tends to be both expensive to produce and cumbersome. However, we believe that the real challenge is to produce good quality and adaptable software. Above all we consider that uses of the technology, for a variety of reasons, should be based on sound educational objectives and not be merely the opportunity for some technologist to exercise his ingenuity. Above all the educational objectives in using the computer should be sound.

It is one thing to have enthusiasm it is another to have a sound overview of the progress and development of the pupils. Using these techniques we are adding ways of enhancing the personal development of all pupils. Access to the wider curriculum and experiences normally associates with mainstream education. We see ways of enhancing the personal self esteem and development of pupils.

There is the question still about who should develop materials/ programs to run on the micro computer. Certainly in mainstream development we are settling to the formula of the teacher defining the educational objectives and contents and a specialist undertaking the programming in consultation with the professional teacher. Our experiences is that committed teachers do not have the time to become good programmers. This we believe to be the case for all levels of education. This has implications for Local Education Authorities in that they should be making programmer time available to the progressive and innovatory teachers. We believe that a teacher who becomes sidetracked by enthusiasm for the technology is also becoming sidetracked from his enthusiasm as an educationalist.

In broadening the experiences and knowledge base of pupils in special schools using computers we envisage greater opportunities for wider skills and vocational training in Further Education. This will present a challenge to both the staff and structure of Further Education establishments. Questions will arise about courses, material, support and equipment for both pre-vocational and vocational courses. We are proposing a project, for funding from the EEC, to investigate the implication of school based developments on Continuing Education.

Appendix.

Manchester Education Authority.

(1) Micro Electronics Development Group:

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John Sweeney
Neil Waller
Pam Winn
John Ashurst
Anne Heard

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Barlow Moor Road
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M2o 8PW
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(2) Working Party - Special Education

Paula Halliday (Headteacher, Lancasterian)
Paul Murphy (M.E.C.)
Anthony Lewis (Inspector, Special Education, M.E.C.)
Michael Malloy (Director S.E.R.I.S.)
Wendy Lockwood (Headteacher, Melland)
Shirley Johnson (Headteacher, Telford)
Susan Fagg (Teacher, Piper Hill)
Roger Bates (Teacher, Lancasterian)
Stevart Rees (Lecturer, Manchester Polytechnic)
Patricia Lomax (Teacher, Shawbrook)
Robert Dyke (Director, S.E.M.E.R.C.)
S. Bates (Teacher, Shawgrove)
Dr. Gill (Educational Psychologist)
Maureen Mulligan (Teacher, Margaret Barclay)
Irene Hegarty (Fielden Park, Further Education College.)

The Computer as an Educational Tool

Bernt Pedersen, Hönefoss, Norway.

Summary:

We describe a computer assisted system for teaching native language reading and writing skills, and for simulating every-day situations. Our model is based on multichannel communication with the subject teached. The aim of our system design is to make it flexible for multi purpose use. Both the teacher and the pupil should have the opportunity to reconstruct the material presented and the presentation.

We also give a description of a new system design that we at the present moment is working on. This system is designed in order to give the teacher more power in making his own educational material. "Ownership" to the material presented we believe is a crucial point in the process of getting more teachers to use computers as educational tools.

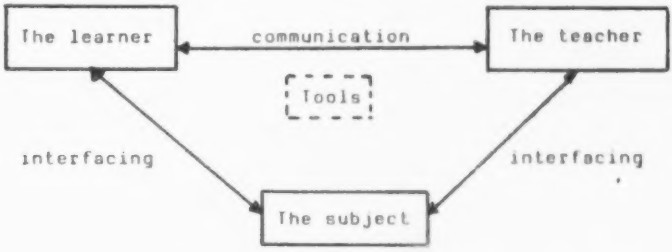
The Daisy project in Norway is an experiment. It is a cooperation between 16 counties in the eastern part of Norway. Its goal is to serve these counties with advice and experience as well as to practising teachers in the school. Special education is one of our fields of working, but it is not the major one. We see however that development for the special education, has to be connected to the over-all education. Otherwise the computer could act as an exclusive tool for special purposes and by this become devaluated as an over-all communicative aid.

Education is a process where learning is supposed to take place. The process does impact on both the learner and the educator. In the process the learner is stimulated to systemize his experiences. The experiences is gained through active use of tools

and concepts. When the process triggers creativity we have a proof that the learning is moving towards success. These simple pedagogical guidelines are essential for our work, and we use them to design educational systems in which both the learner and the educator is developing.

WHat role does a computer play in the process of education?

In order to answer this we have to look upon the teaching situation. Normally it involves three parts in communication:

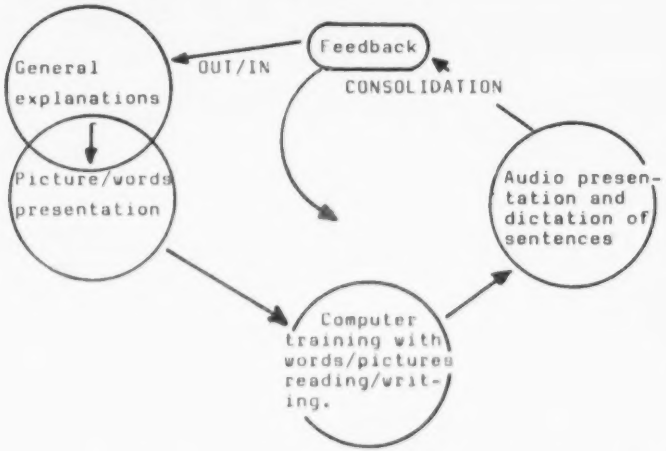


If there is going to be learned something about the subject, there has to be set up an interface between the subject and the learner. The teacher is initially there to help connecting and stimulating this interfacing. And to help him doing this there are tools available, lots of tools. A new tool is the computer.

Of course, any one using tools will tend to use those which has proven most successful or those which is most familiar (that is for the teacher). That will initially disfavour sophisticated new tools and conserve developments until the point of necessary familiarity and flexibility has been reached. In our project we are painfully aware of this, and has been forced to take one small step at the time.

Initially we used the computer as an instrument to drill & practice. This has been done by lots of others and we gained the same experience. We could not see any significant pre by using the computer in this way. It also conservated teaching methods which are not accepted as the best.

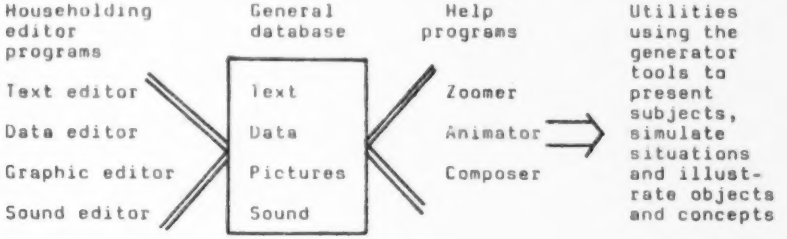
We then developed a teaching system involving several tools in cooperation. In order to keep familiarity, we used the system initially to work with drill & practice. The idea was to force the pupil to interface with the subject by several channels, hoping for an inforcement. We can describe a typical set up:



The pupil is circled in this system, interfacing with the subject by as many senses as possible. The result was reported to be a significant improvement. And in this system it looks like the computer plays an important role. If it was taken away, efficiency were lost.

The next step was to leave drill & practice and go into simulation. We wanted to keep the multichannel interfacing. We tried a small project in simulating an everyday situation: shopping. The computer was set to simulate a cashiers machine. But it had some special features, like keeping in mind which goods the pupil bought, and classifying the goods in necessary and unnecessary things. The result from this project showed us that some everyday situations could be learned and trained at school by the help of a computer.
We are now planning systems for training other activities, like travelling and money handling.

Aw we worked with this small projects, we became more and more aware of the interfacing between the teacher and the computer. Our initial programs were not very teacher adaptable. The item lists were rigid, and did not suit the teachers general need for adapting material to his purpose. As a result we are now working on a program system which is more like a application generator for pedagogical purposes. Shortly it can be described:



This generator is a tremendous task compared with what we have done previously. But we have to dive into this system sooner or later in order to give the teacher what he wants: an adaptable tool to process and stimulate communication and creativity.

Computers in Special Education

Bent Larsen, Frederikssund, Denmark.

Introduction:

I very much appreciate the opportunity given me by the conference organizers to present a paper concerning "HANDICAP AND COMMUNICATION", and I hereby wish to thank the EASE, the DFSP and the Danish Ministry of Education for inviting me.

Special educators must realize, that computers are comming, that the microprocessor and the information technologies will make a contribution to special education in future. Some meet this challenge with enthusiasme, others with fear. The very exciting question is: "Will this new future prove to be revolutionary to the life of the handicapped?"

In one respect this question can already be answered with a YES, namely in the field of COMMUNICATION. It is my intention to throw light on this fact through my paper.

HANDICAPS.

In the past, when the words "handicap" and "the handicapped" were used, it was largely in the sense of individual disablement resulting from one or more impaired psysical or psychological functions. This facilitated categorizing and defining the handicapped in relation to other people, satisfying many interests and giving rise to a handicap policy charactarized by protection, tutelage and segregation.

Today most countries have a far more flexible concept of the

term handicap, and consider the environment as contributary to the nature and extent of a person's handicap. This recognition makes limited categorical description more difficult, but presents the challenge of "doing something" about the handicap in a direct and committed way.

(Model I to be placed here)

A handicap always reflects disharmony between an individual and his surroundings. Both sides are responsible for its existence and for remedying or limiting it.

Instruction, training, psysical therapy, and so on, can help the person to develop his functional level optimally, and his surroundings can be adapted so that his impairment restricts his selfexpression as little as possible.

This emphasizes the fact that a handicap is not a fixed, static phenomenon, but a dynamic reality which can be intensified or reduced through the concerted social actions of the parties involved in it.

It can only be eliminated by accepting the fact that despite a more or less severe functional impairment, the handicapped person is a normal individual, whose personality development and ambitions as a whole correspond to those of all other people. The psychological research has taught us, that the perspective of development is a decisive element in understanding what a handicap is or will be.

By manipulating his surroundings, a person creates concepts which are transformed into language, thus enabling him to communicate with others. Throughout our lives, our ability to communicate amounts to the ability to receive and transmit information, and it is the overshadowing factor in our social capability and per-

sonal status. To compromise or reject this factor serves to initiate a handicap more than enything else.

(Model 2 to be placed here)

To restrict a person's options for developing an information network, in the broadest sense of the word, through intensive contact with his surroundings, is to handicap that person, because he lives in a world where the exchange of information is the foundation of all social life.

Information rejection has two aspects: an impaired transmitting and receiving function, or a limited store of communicable information. In many cases both aspects apply, thus stressing the handicap.

Impaired reading ability leading to a limited store of information can be far more handicapping than, for instance, total blindness, when the blind person has acquired a high level of information through intensive compensation (e.g. Braille, sound recordings of books, etc.).

Thus, in addition to its social status, communication is the basic factor for human development in quantitative and qualitative terms. Therefore, communication is the main theme for the efforts of any society to reduce the numbers of its handicapped citizens. Teaching, training, advice, guidance, technical aids and so on attempt to increase the communicative ability of the functionally impaired. These endeavours have long since been a characteristic feature of most highly developed industrial countries.

Today good advisory systems are trying to inform and advise the rest of the society about their contribution to remedying or limiting handicaps through education and social efforts. Finally aids have been developed to substantially increase the communicative ability of the functionally impaired, thus reducing or even

eliminating handicaps. The microcomputer or rather the microprocessor and the new technology connected to it, has created the most advanced and until now the most revolutionary aid as far as communication is concerned. I'll return to this later on.

EDUCATIONAL HANDICAP.

In generel, modern society challenges its members by demanding that they are able to:

ambutate
cogitate
communicate
socialize

(Model 3 to be placed here)

The educational system reflects these demands in part by attempting to devise education and training that develop pupils' abilities and aptitudes in these areas and in part by integrating these demands into the educational process. Thus, the educational system plays a part in generating handicaps. At the same time, all developed countries have a clear obligation to restrict or remedy the effects of given handicaps through special support and accomodation. This paradox is the complex point in understanding the concept handicapped.

As communicative problems are a salient feature of most handicaps, and the predominant one in some, it makes instruction particularly difficult because the dialog between pupil and teacher is the focal point of learning.

Functional disabilities which can impair communication are often complex, although they are normally grouped under visual, hearing and speech abilities.

But these "communicative abilities" are not as simple as they may seem. Firstly they are often interrelated or accompanied by other

functional problems, and secondly they each contain psysical and psychological components, impressive and expressive factors.

Let this be illustrated through some theoretical information communication models:

CONCEPT OF COMMUNICATION.

(Model 4 to be placed here)

It should be underlined, that if we want the full picture of the communicative process, we must consider all these elements in relation to each other, the coherence between them, the totality of the process. There is no process with one of the shown elements missing.

In the normal vocal process of communication, the MESSAGE is built up of language - the mother tongue of every single individual - and most of the message is given through verbal elements. But in every verbal interaction, one will find plain nonverbal elements. The nonverbal elements are just as important as are the verbal ones. The nonverbal elements are gesture, facial expressions, emotional expressions, conduct etc. maybe sign language. The individual is part of the process as the transmitter or the receiver or usually by turn as the transmitter and the receiver.

For the single individual the concept of communication is an internal process:

(Model 5 to be placed here)

This model gives us the guideline to the next model illustrating the communicative handicap.

(Model 6 to be placed here)

One should beware of the very dangerous mistakes, that could be done in this connection. A person without the ability to transmit information (no 2) could easily be mistaken with no 1 or no 3. That is, what has happened in the past, when young children with severe cerebral palsy without any motor language has been taken for mentally retarded.

The conclusion from this should be:

When speaking of communicative handicaps - they should be defined more precisely as problems with input, output or processing. And if moreover, it is necessary to take steps to remedy or restrict the undesirable effects of such a handicap, it is crucial that its composition is described in detail.

PROGRAMMED COMMUNICATION.

When the computer is described as a communicative tool, it means that some of the process factors, that I have mentioned, obviously can be supported by electronic aids, others of course can not (or perhaps one should say "NOT YET"). There are a number of possibilities, which can work, and which should be tested intensively in future.

One of the special advantages of the new technology is its potential for swift transmission of information from one sense modality to another.

Time does not allow to go into details in this respect, but I shall finish my paper with an example from my own school given evidence to the more theoretical aspects that I have spoken about until now.

THE PROJECT.

I shall give a short description of an experimental project involving two severely motor handicapped children - a boy of 14 and a girl of 12 - both with cerebral palsy and without any verbal

language at all. The project started three years ago, when they were 11 og 9.

Both the children were in early childhood through medical examination diagnosticated as severely mental retarded and referred to institutions for children with mental retardation. The parents refused to accept the diagnosis but at least accepted the placing.

To give an impression of the total helplessness of the children, let me present short cut of a video tape giving some details from daily life at school.

(Model 6 to be replaced here)

This is what the two children look like today. I am sorry that we did not have a video camera three years ago, when the project started. At the time they did not have that much control of their heads, their body or their extremities. Substantial physiotherapy going in hand with other training has resulted in these much better conditions.

At the time the project started, none of the children had ever communicated in any other way than through unrealiable eyecontact and some emotionel expressions. The idea of the project was the recognition of the parents attitude: not to accept the diagnosis: mental retardation.

The background for the activity was, that we were made acquainted with an electronic communication aid called CARBA-linguaduc.

As you can see, the system consists of various separated components, connected to each other with a tangle of wiring. The basic function

is, that the pushing of a pneumatic cushion closes the electric circuit and releases different functions as starting toys, spotlights, a pointing-out screen etc. Also an electric typewriter and a TV-monitor may be connected.

I'll not go into details about this equipment, since we left it after two years. But I'll briefly give a few conclusions:

1. The equipment did not work with sufficient stability.

2. It obviously had several technical defects and disadvantages in function and contruction.

3. The children were very inconveniently locked in a position in front of the equipment, and as such the flexibility is very limited.

4. The equipment is extremely costly.

One of the main problems in the work with the severely psysical handicapped children is the selection or construction of a suitable switch and training in the use of it. There are several solutions on the market both with pneumatic, infrared, radar, acoustic and mechanical detection, but in many cases individual switches must be constructed. This will also refer to the use of microcomputers in special education in future, and I feel, that it is an essential point at this conference to stress the importance of international or at least intereuropean coordination and efforts in generating switches for individual use for psysically handicapped persons.

In our own project we had terrible troubles with the switchproblem, and we trained the children with the pneumatic switch for more than a year. We had no technical assistance and we believed in the pneumatic solution as being the best solution. Today we have taken other considerations.

During the training the children more and more disclosed intellectual competency. After 1 1/2 year the boy expressed his first

sentence in his whole life. It concerned his lesson with the physiotherapist, and he said:

"I am bored!"
"OK - what do you want?"
"I want to play ninepins!"

In order to understand this miracle, I think it is essential to realize the real extreme severity of the childrens handicap.

(Model 7 to be placed here)

THE RAVEN TEST

At the end of the first two years of work in the project we realized the importance of having the two children tested with a normal intelligence test. The american test RAVEN was chosen.

Since the children were not able to point at the figures, we hit on the idea to construct a device enabling them to point out with one single switch.

The device is seen here.
It has four regulations:

1. Speed ajustment of lightspot
2. Selection of number of pointing out lamps.
3. Corresponding sound volume
4. "Bolting time" - which is the way of eliminating undisirable spastic movements.

With this device we succeeded in testing the two children and found their intelligence AVERAGE.

We had reached the goal: to prove that there was intellectual capability and that the children had the possibility of communication. And at the same time the psychologist could record a well defined modification of the childrens behaviour. They now had a much more high degree of self-consciousness and were more active in their emotional expression, more cooperative and able to contribute to dayly decisions.

THE NEW DEVICE.

This device let us to the idea to use the procedure for teaching and communication, and not only for testing. It was made possible through the construction of a similar device with a built-in screen:

Note that there is a TEACHERS SWITCH together with the PUPILS SWITCH allowing very near corresponding teamwork between the two. Worksheets from all fields of teaching as well as for communication can easily be produced - and is very often done by the teacher and the pupil together.
You will find samples of worksheets used by the two children in the file at the table here.

(Model 8 to be placed here)

The advantages of this device are obvious:

1. Fully portable
2. Chargeable
3. Not heavy
4. High flexibility in education
5. Encouraging in the interaction between teacher and student
6. Cheap in production
7. Ordinary writingpaper as worksheets

And it has the same four regulations as the former device.

RESEARCH EQUIPMENT.

During our project work we had the opportunity to get in contact with an ingeneer from The Engineering Academy of Denmark, who was in charge of a research project developing this device at the Department of Electrical Engineering.

The ingeneer has worked for two years on the developing and the clinical testing of this portable communication device, specially constructed for the use of adult patients at nursing-homes. These adults as a result of serious diseases cannot speak - it may be owing to cerebral palsy, schlerosis, cerebral haemorrhage etc. One of the users of the equipment Mr. Frank Dalhof is with us here today, and you can get in touch with him for further details concerning the use of it. He has even written a book about his own life.

Six prototypes of the aid have been constructed and through a private fund we have acquired a copy at our school for the mentioned two children.

I shall give a quick run through the device and furthermore it will be available at the conference during this week.

1. The device is not a microcomputer but should be described as a microprocessed, programmed device with a miniature TV screen.

2. It can be operated with a normal keyboard, a joystic, a double switch or a single switch.

3. It operates with two alphabeths (capital and small letters) and BLISS symbol memory containing 2oo symbols.

4. The device contains a number of editorial facilities in a symbol system shown at the right side of the screen.

5. It contains a text memory of three pages and

6. a word bank of 6oo words organized alphabetically and according to frequency in the language.

7. It can be mounted on and powersupplied from a wheelchair (As Mr. Frank Dalhof can show you).

CLOSING.

I shall close this paper about HANDICAP AND COMMUNICATION by telling you, that the two children, I mentioned, are now educated exclusively with the two described devices. They use normal textbooks and worksheets for individual work and they communicate trough this equipment. The next step ought to be a microcomputer programmed with a menu scheduled for their daily living.

They still work extremely slow owing to the cerebral palsy which also gives rise to tremendous bad concentration.

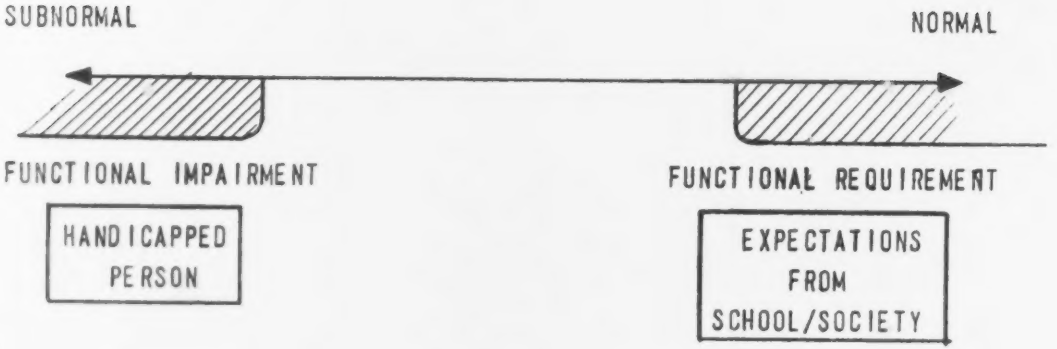
But their lives have changed since they have acquired a medium through which they are able to communicate. They were doomed to live in isolation as mentally defects - they live.

Let me join one of my colleages in his book: "MENTAL DEFIECIENCY-LANGUAGE - COMMUNICATION", when he states in Latin:

COMMUNICO ERGO SUM

Model 1

THE RELATIVE CONCEPT OF HANDICAP

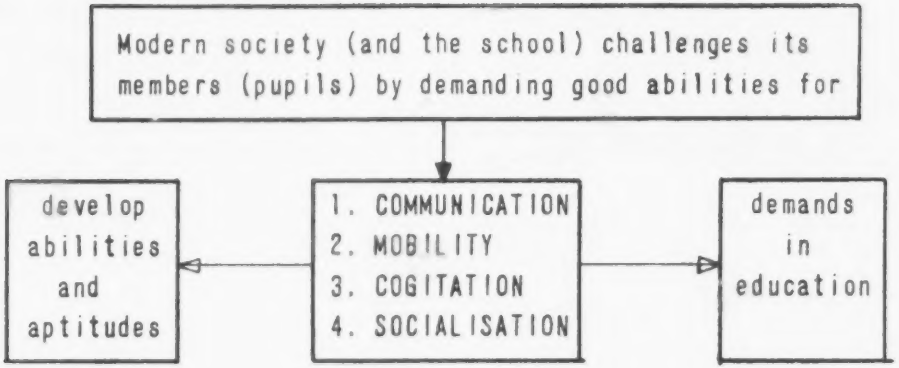


Model 2

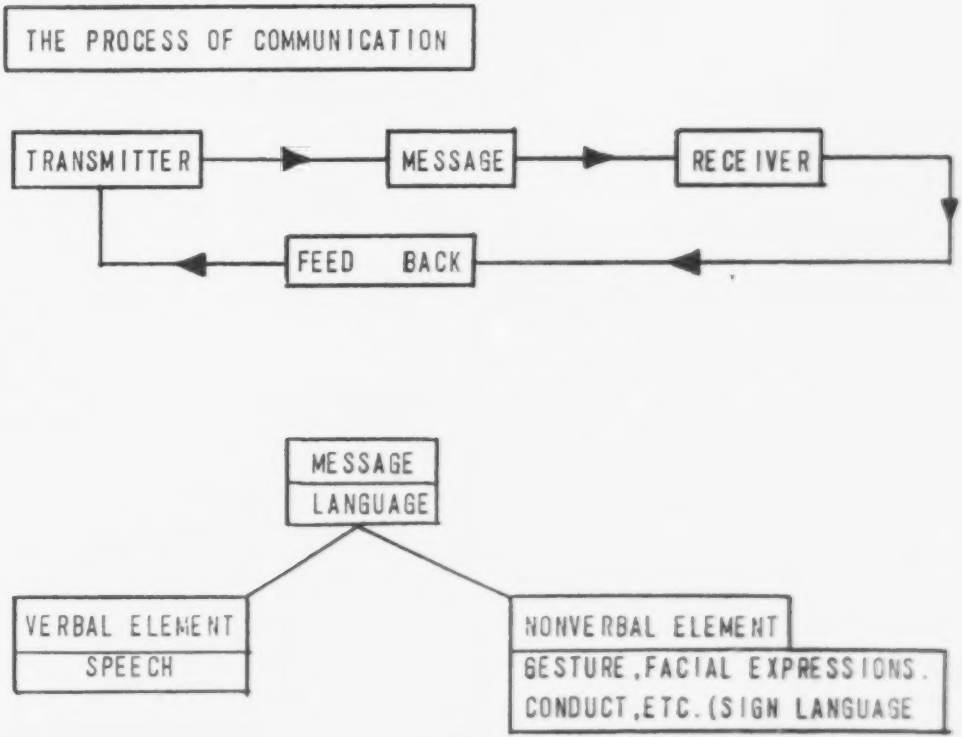
Throughout our lives, our ability to communicate amounts to the ability to receive and transmit information, and is the overshadowing factor in our social capability and personal status.

To compromise or reject this factor serves to initiate a handicap more than anything else.

Model 3

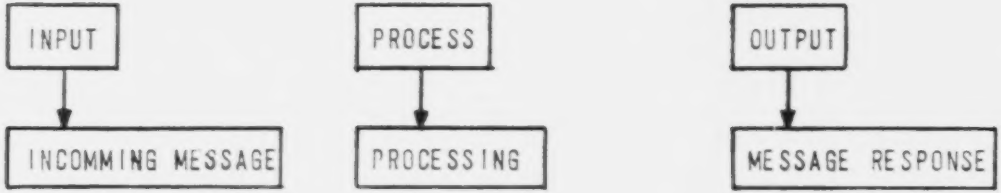

Modern society (and the school) challenges its members (pupils) by demanding good abilities for
develop abilities and aptitudes
1. COMMUNICATION
2. MOBILITY
3. COGITATION
4. SOCIALISATION
demands in education

Model 4


THE PROCESS OF COMMUNICATION
TRANSMITTER
MESSAGE
RECEIVER
FEED BACK
MESSAGE
LANGUAGE
VERBAL ELEMENT
SPEECH
NONVERBAL ELEMENT
GESTURE, FACIAL EXPRESSIONS.
CONDUCT, ETC. (SIGN LANGUAGE

Model 5

THE CONCEPT OF COMMUNICATION



SENSATION:

AUDITIVE
VISUAL
TACTILE
KINESTHETIC

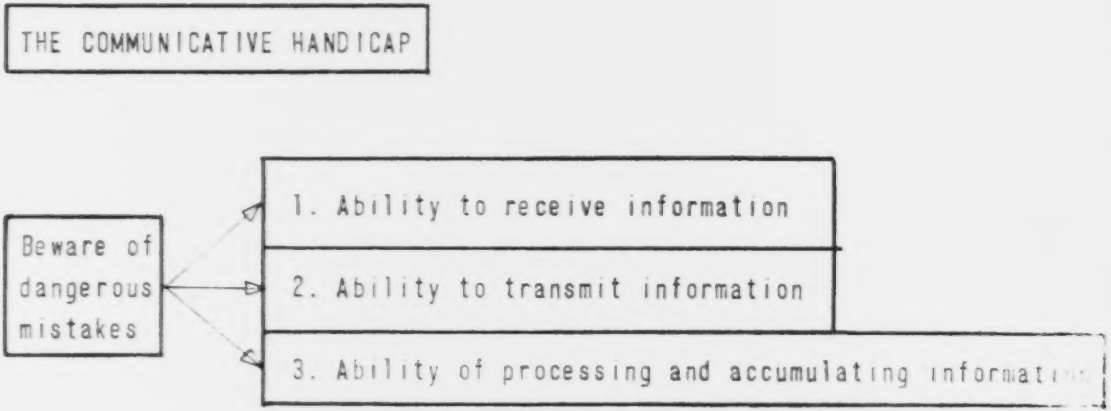
BRAIN FUNCTION

MEMORY
ABILITY FOR CO-ORDINATION
INTELLECTUAL CAPACITY

ORALLY

GRAPHICALLY
SIGN (MOTORILY)

Model 6


THE COMMUNICATIVE HANDICAP
Beware of dangerous mistakes
1. Ability to receive information
2. Ability to transmit information
3. Ability of processing and accumulating information

Model 7

COMBINED HANDICAP

	MOTOR HANDICAPPED WITH SPEECH	MOTOR HANDICAPPED WITHOUT SPEECH
1. COMMUNICATION	+	— (+)
2. MOBILITY	— (+)	— (+)
3. COGIGATION	+	—
4. SOCIALISATION	+	—

Model 8

COMMUNICATIVE DEVICE

1. FULLY PORTABLE
2. CHARGEABLE
3. NOT HEAVY
4. HIGH FLEXIBILITY IN EDUCATING
5. ENCOURAGING IN INTERACTION
6. CHEAP IN PRODUCTION
7. ORDINARY WRITINGPAPER AS WORKSHEETS

Using Micros in Special Education in England, Wales and Northern Ireland

Mary H. Hope, London, United Kingdom.

My aim in relating our experience of disseminating information about using micros in special education is to share with you some of the practicalities and the philosophy so that you can consider adopting some of the approaches that seem to be succesful. I will describe the goverment programme, known at the Microelectronics Education Programme (MEP), to encourage the use of micros in school and the particular ways in which we have worked with teachers of children with special educational needs. As this has now been going for almost four years there should be some lessons worth sharing. One of the frequent comments from overseas visitors is that the advantages of the UK approach is that we did not spend years talking about it, but got on to see what could be achieved. This pragmatic approach has some interesting features which I will try and outline for you.

I will describe;-

1) The Microelectronics Education Programme (MEP), the background and way of working with particular reference to the Special Education Microelectronic Resource Centres (SEMERCS),

2) The changing nature of the information required,

and to give a context to the information we need to disseminate I will

3) Describe an aspect of software production

4) Outline how we have tackled teacher training courses

and to help the process of focussing in on the possible areas of international cooperation I will

5) List our present tasks.

I suggest that when plenary session of Friday is looking at the way forvard this list might be considered.

1) FACTS ABOUT THE MICROELECTRONIC EDUCATION PROGRAMME (MEP)

MEP covers England, Wales and Nothern Ireland. Scotland has a separate but similiar programme.

It is funded by the Departement of Education and Science and was originally conceived as a four year programme from 1980 to 1984. However the Director was not appointed until well into the first year so in real terms the start of the programme was in 1981. It has now been extended until 1986.

The aim of the programme as described by the Director, Richard Fothergill, is "to help schools prepare children for a life in which systems and devices based on microelectronics are commonplace and pervasive".

The budget is around £ 5 million per year, and about 12% of this is devoted to special education. The philosophy behind the special education work within MEP is that needs of this group are ADDITIONAL rather than DIFFERENT.

There are three main strands to the organisation of MEP. These are information, curriculum development and teacher training. There are some slight differences in the way these are organised for mainstream teachers and teachers of special education. For the sake of simplicity I will only describe the mechanisms for the special education part of the programme.

SEMERCS

The main means of information dissemination are the Special Education Microelectronics Resource Centres (SEMERCs).

The aim of the resource centres is to show the handware and software that can be of use to special education. They all have a permanent exhibition on display, but more importantly act as a mobile resource and go out to teachers centres and schools to give talks and demonstrations.

The practical help that the SEMERCs offer is

- information and advice about the use of microelectronics with children with learning difficulties, including inservice training,
- demonstrations of the available software and hardware, with advice about the latest devices and programs,
- a focus for discussion and debate about good practice, bringing together people with common interests or problems,
- a certain amount of "copyright free" software which may be copied at the SEMERC.

There are four of these to cover England, Wales and Northern Ireland. They are in Bristol, Newcastle, Manchester and London. A few statistics will give some idea of the scale on the task.

- each SEMERC has about 400 special schools and about 4.000 special education teachers in its area. (They do however also advice teachers in remedial departments of ordinary schools.)
- each SEMERC has to liaise with about 25 different local education authorities
- to give an indication of the geographical distances involved the average SEMERC manager does about 18.000 miles per year in the course of duty.

As if these were not sufficient problems the original level of staffing was one person per SEMERC. Despite the enormity of the task and the small resources we did find people willing to take on the job. In the last year the value of work being done has been noted and the staffing now is three professional staff in each centre. There is also a part time information consultant working with me on the information sheets and databases.

On the curriculum development side there is a budget for software development and funds are given for acceptable proposals. The level of funding is low and the emphasis is very much on the production of materials rather than on more fundamental research. Most of the projects involve one teacher and a programmer and last about a year. There are currently about 25 curriculum development projects under way.

The teacher training is done at both the "awareness" level and in more depth. The SEMERCs run a large number of short courses to introduce teachers to microelectronics, and we have a part time teacher training consultant who organises longer courses.

2) THE CHANGING OF INFORMATION REQUIRED

One of the most noticable changes has been how the questions that have been asked of me and the SEMERCs have changed over the years. It is interesting to chart these and speculate about the sort of question we will be receiving in the next year or so.

In the early years one of the main charracteristics of the use of micros was that it was teacher initiated, ie the impetus came from the classroom rather than from policy makers or administrators. This led to

- duplication of effort
- a mulitiplicity of prototypes
- short, easily produced programs that were directly related to perceived classroom needs
- a feeling of isolation among workers
- a lack of support from the teaching hierarchy.

Against this background the sort of questions we were most frequently asked were, what can computers do? who is using computers? and what computer should we get?

The response to this situation was to produce an information sheet describing how computers could be used and a directory of names and adresses of people who were using computers.

In 1981/82 this was a solution. Now however both of these documents are out of print. The reasons are that the questions being asked have changed and too many people are using micros for a hardcopy directory of "who is doing what" to be manageable.

1983/84 has been characterised by a software explosion and many of the questions now asked relate to the availability of software for a particular machine or group of children. So in respon-

se to this we have produced a range of information sheets mainly focussing on software (ie lists of programs, reviews, guidance on evaluation, a description of curriculum development projects and advice about getting funds for software development).

The interesting question is what will teachers be asking us in 1985 and onwards? My hunch is that the questions will become less "global" and more specific to the learning needs of the individual pupil. To give an example a typical question now is "what software is availabe for children with moderate learning difficulties?" I think the question of the future will be more along the lines of "what software is available to help a 16 year old with a reading age of 8 to fill in forms?" At the moment we only get this sort of enquiry from parents. The only solution to this will be to have a database of software that allows us to do key word searching. We have only just started to explore this very exciting avenue.

3) AN ASPECT OF SOFTWARE PRODUCTION

Having looked at the process of how information is being disseminated it will help build up a more complete picture if we now consider one of the major information concerns, ie software.

Perhaps the major change over the last one or two years has been the availability of software. This has been due to a number of reasons. One is that if there is a need for a product market forces will step in, and a large number of small software firms have grown up during the last few years. Software production is an ideal cottage industry as the capital outlay is small, the returns are fairly immediate and many of the teachers involved were writing programs for their own use anyway. MEP has also had a part to play in the growth of software, both in the direct commissioning of programs and in the general momentum it has provided to the use of computers in education.

The aspect of software production I would like to consider is the starting point for the idea. Or to put it more grandly, the eitiology of software. My feeling is that both commercial and MEP soft-

ware has up until now had its roots firmly based on perceived classroom need, but that there are other starting points for software ideas and that if our information network is efficient we will probably see these developing in the next few years.

The four possible starting points are;-

a) Meeting currently perceived classroom needs.
The first programs for microcomputers were written by teachers who wrote programs in the evening. For obvious reasons the programs had a direct bearing on what they planned to teach on Monday morning. It is also worth noting that another characteristic was that they concentrated on tasks that were easy to program, rather than those that were most educationally valid.

Although latterly the educational quality has improved both MEP and commercial publishers concentrate on packages that are classroom based and reflect the present curriculum.

My argument is certainly not that this is wrong, but that there are other starting points that are complementary.

b) Technology led software development.
The disparaging term for this approach is the "solution in search of a problem". There is now, I would argue, a need for teachers of children with learning difficulties to look at new technological developments and consider how light pens/touch screens/bar code readers/speech etc. can be used to help our children. Currently we are not systematically using this approach and probably not fully exploiting the possibilities of using this approach. I would encourage others not to be too pejorative of the solution in search of a problem as long as it is used as part of a wider curriculum development approach.

c) Software evolving from our knowledge of how children learn.
It could be argued that the strictly logical way to develop

software or curriculum materials generally is to start with what we know about how children learn, and to work from there. We know that the power of the micro is that it is interactive, it motivates children, it can quickly process information and feed it back to the user, and it can produce a certain degree of animation. Surely, it can be argued, this powerful technology can enable us to produce learning packages based on proven psychological theories? But it seems that research and practice remain as far apart as ever. Some of the reasons are - that research tends to generate more research, rather than explore how it can be translated into classroom practice, - teachers who are best suited to interpreting research findings into software specifications do not have the time to read academic journals, - and it must be admitted that our knowledge of how children learn is still fairly fuzzy around the edges.

It is salutory to reflect that the best known example of software based on a theory of how children learn is Seymour Papert's LOGO and the development time of that has to be measured in man years.

However as thinking about software becomes more sophisticated it is likely that learning theory and software ideas will start to come together, and encouragement should be given to both teachers and researchers to help bring this about.

d] Filling gaps in a curriculum map.

If we had a generally accepted curriculum for, say, children with moderate learning difficulties it would be possible to look at the currently available software and consider which parts of the curriculum could be helped by it. In this way we would discover which parts of the curriculum had no software support. We could then consider if these parts could potentially be helped by the new technology and if so we could then proceed to draw up the specification. One of the major problems to this approach is the decentralised nature of the UK educational system which means that there is no centrally de-

scribed curriculum. Because we are less constrained by examination syllabi there is a strong chance that attempts to specify one will result either in a core curriculum stated in such all embracing terms that it is acceptable to everyone but not in the least bit useful for this type of exercise, or one that it is very school specific and has limited acceptability.

However despite these problems we have recently completed a small exercise with one of the Local Education Authorities and now have a "curriculum man" which outlines a core curriculum for children with moderate learning difficulties and shows which software could help in the teaching of which areas. As might be expected the majority of software is in the basic skills area. We will shortly be going on to consider if, and how, the gaps in the map can be filled.

There is a danger that this approach will raise more questions than solutions, but at the very least it serves to focus discussion on the curriculum.

4) TEACHER TRAINING

Up until a year ago it was probably fair to describe all the training on micros in special education as "awareness" training. In other words we were introducing micros to teachers and policy makers and showing what they could do. Most of the courses were for one day, altough we did run some one week courses. The demand for these seems to be insatiable, and even those people who have been on the longer courses still wish to attend further courses as new devices and approaches are developed.

However, as there is now a solid core of teachers with experience of micros we have moved onto a second phase and are now developing one week courses that go beyond the "awareness" stage. These "program specification" courses are aimed at teachers who will in the future act as resource people within an education authority, and are designed to give them the tools to carry out this role. A further aim of the course is to produce some specifications for educational computer programs. One of the major dif-

ferences between the "awareness" courses and the "program specification" ones is that the former focus on the computer whereas the latter consider the curriculum and only then move on to consider what sort of programs could help in the teaching of it. This reflects the more general trend to try and integrate the computer into the classroom, and view it as just one more resource.

Briefly the format of the course is that the first day and half is spend considering the need for and the various forms of curriculum framework. Groups then do a task analysis on a particular part of the curriculum that they feel causes difficulty. In the final half of the week the groups work on the preparation of computer specifications. These are not coded on the course, but are followed up so that the best are converted into working programs.

We have now run three of these courses, and although som of the participants have, initially, espressed concern about not getting "down to considering the computer" quickly enough, the consensus on completion of the courses has been that the emphasis on the curriculum is appropriate.

5) OUR PRESENT MAIN TASKS

I will summarise these under the three headings used above; -

a) Information tasks
   - Create a database of software so that we can easily find out which software will help with particular teaching needs.
   - Create a database of people using micros in special education and including those who are doing developmental work.
   - Build up a body of knowledge about how best to use micros in special education.

b) Curriculum development tasks
   - To ensure that the software that is needed to help children with special educational needs is produced.

c) Teacher training tasks
- Train teachers to think in terms of the educational needs of the child and THEN to consider the contribution of software.
- Inform the special education policy makers about the potential of micros.

In conclusion, as this is an international conference I will merely point out the obvious. That is that many of these tasks will undoubtedly be relevant to other countries and that an exchange of information and software can only be mutually beneficial. The further task therefore that has to be added to the list is to work out how this can be brought about.

April 1984

Eurydice

Computers in Special Education

Nina Levysohn, Ministry of Education, Denmark.

EYRIDICE.

Ladies and Gentlemen. As you will have seen, the Eurydice network is next on the agenda. Eyrydice is the Education Information Network in the European Community, and I shall now make some elaboration on its organization, its functions, and on the user group who has access to it. Furthermore I'll briefly describe the cooperation with other international information networks.

In 1976 the Council of the European Communities and the Ministers of Education adopted on action programme in the field of education. They agreed to set up a network of information services on education in the EEC countries in order to increase and improve the circulation of information in the area of education policy. However, it was recommended from the beginning that the user group to benefit from these services be confined to those in policy making positions.

Each member country has therefore designated one or two national information units to participate in the network, and the Commission of the European Communities has arranged the establishment of a Central Unit in Brussels to cooperate with the Commissions's Education Service and to coordinate and animate the network.

At this point I should like to emphasize that I am not here as a representative of the EEC, but am acting entirely as the representative of the Danish Eurydice Unit employed by the Ministry of Education. I am stressing that as an example of where the majority of the National Units are situated. 11 units out of 13 are directly under the authority of the Ministry of Education with the exception of Italy where the unit is placed in the research center, Enciclopedia Italiana and England where the unit is placed in the

National Foundation for Educational Research.

I should like to emphasize that from a Danish point of view, this network contributes to one of the most important aspects of the cooperation within the field of education in the EEC-countries: namely the mutual exchange of information as a means to improve our understanding of the various educational systems in the member states.

These different structures also mean different resources. Not in terms of obligations, but in terms of services given, staff, etc. Since the educational structures in the EEC-countries as well as the capacity of the national units vary considerably, it was decided from the beginning that the definition of a policy maker, who would consequently have access to the network, was to be made at national level. The Danish Unit has made no such definition. It is decided from case to case. A person who wants to pose a question to the network will have to state the purpose for this requestion this information and it is then up to my judgement to decide whether it is a relevant question in terms of the Eurydice requirements. As the purpose in my experience is seldom a single-person-matter, it will be possible in most cases to find a person involved who is rated as a policy maker and who will then act as the responsible person for the request.

At the outset, it was agreed that on its first year of operation, the Eurydice network should concentrate its activities on 4 priority themes, whose significance had been emphasized by the said Community Action Programme.

- transition from school to working life
- teaching and learning of foreign languages
- education of migrants and their families
- policies and conditions of admission to higher education.

So Eurydice's request-answer service was therefore based on these themes. But a fifth theme was added in order to cover all the questions that would not fit into one of the priority themes, and this was called "major policy trends in education". Over the last years the development has moved in the direction of an increasing number of questions to come under this last theme. Of the approximately 1oo questions per year to be channelled through the network, almost 5o% are on major policy trends.

Admission to higher education remains the most important of the 4 priority themes in terms of number of questions. Transition from school to working life has also been one of the "popular" themes. With the introduction of the new pilot-projects on this subject, this theme seems to have attracted an even more noticeable attention.

When the four priority themes were chosen in 1978, they were considered to constitute the most important aspects of the educational system to be of general interest to all the member states. However, to some extent, the priorities have changed over the years, and this is not unlikely to result in a change of the priority themes in the future. This last year has seen a considerable number of requests on "the new information technologies" and "demographic changes" as a label for requests concerning the impact of the falling birth rates, the overproduction of teachers and teachers' working conditions.

The establishment of foreign language information centres in all the EEC-countries has been planned by the Education Committee. these centres will naturally take over the responsibility for the direct exchange of information on foreign languages, and I suppose that this, in turn, means that the Eurydice priority theme on the teaching and learning of foreign languages becomes superfluous.

The development within the field of new information technologies has been one of the main priorities in the Education Committee this last year, which has been reflected in the number of questions channelled through the network on this theme. However, as it is not covered by any of the priority themes it has made out a great

percentage of the major policy theme.

These 2 examples of development in the education sector are very likely to cause an evaluation of the immediate relevance of the priority themes.

And now to something which will seem to be of more immediate interest to you as experts in aspects relating to special education. Questions concerning the education of handicapped children are also put under the major policy trends. In this connection it should be mentioned that during the French presidency, the Education Committee has been discussing the integration of handicapped children into the "normal/ordinary " school system. These discussions are likely to lead to conclusions on this subject at the meeting of Ministers of Education in Brussels on 21 May. This will mean suggestions for a strengthening of the continued cooperation within this field.

The European Parliament has asked whether it would be possible to add a priority theme on special education for handicapped children to the existing Eurydice priority themes. So far this has not been possible because of inadequate resources. Introducing and thus emphasizing a new theme would immediately cause an increase in requests. This, however, does not mean that requests for information on special education are excluded from the network. To give you an idea of what kind of questions have been asked, I will show you some examples:

- With regard to a study to be undertaken in Italy concerning handicapped pupils, please indicate what kind of legal provisions exist in your country to protect handicapped children. (Italy).
- Please describe possible provisions for the integration of the handicapped in all forms and levels of education. (Italy).
- What measures have been taken to ease the transition from school to working life for the young handicapped. (England)(Germany).
- How is the problem of pedagogical support for children with difficulties resolved in your country. (France).

- With regard to the different types of handicaps, what measures have been taken for the benefit of handicapped children and how are teachers for handicapped children trained. (Italy).

- In reviewing our policy on equality of opportunity for disabled persons, is special consideration given for candidates with physical or mental disability in public examinations? What form does it take? (Ireland).

Please describe possible attempts at reintegration of deficient children into ordinary classes (methodology, ways and means, teacher training, additional staff). (Belgium).

- Please give names and addresses of schools and centres for technical education and professional re-adaptation of physically and mentally handicapped persons for the central, the regional and the local level. The information is requested in order to take up contacts aiming at the exchange of information and coordinated actions. (Central Unit, Brussels).

But Eurydice is not just this request-answer service solely for the benefit of a small group of policy makers. In order to reach beyond this group, the Eurydice Central Unit publishes 3 bulletins every 3 months on 3 of the priority themes, namely: transition from school to working life, education of migrants, and admission to higher education. A fourth number on the major policy trends has been discussed. These bulletins contains newspaper articles, press releases and review extracts from all the EEC-countries in their original versions with summaries in English, French, and German attached. They are issued to relevant bodies and can be had upon request to the Central Unit.

The bulletins are said to have been very popular in the member countries. However, there seems to be one main objection which is that by the time these bulletins are available, newspaper articles and press releases of 3-4 months' ago tend to have a womewhat limited interest. At the beginning they were issued every month and it is to be hoped that such a situation could appear again.

One of the functions of the Eurydice network is the compilation of up-to-date documentation. Using information supplied by the National Units based on replies to Eurydice requests, the Central Unit in Brussels has made some very popular overviews, for instance "Compulsory Education in the EEC-countries" and "Demographic changes in the EEC-member states". So far approximately 4000 copies of the Compulsory Education publication have been distributed to policy makers, libraries and individuals who have requested copies directly from their National Units.

In order to prepare for further action, the Commission in 1981 launced a number of studies to esteblish overviews of developments in the Member States, and to identify problems and needs in the fields of education and vocational training. The Eurydice Units supplied information to the study on "Education, training and the new information technologies: the establishment of an information base".

Eurydice is not just a self-contained entity: it is out-ward looking. Both centrally but also on the national level there is a close cooperation with other institutions active in the area of educational information, documentation and educational administration such as CEDEFOP, the European Centre for the Development of Vocational Training. This cooperation includes a mutual exchange of publications and participation in each other's meetings. From my own experience I have had much helpful information from the institution which represents the CEDEFOP network in Denmark when I have been dealing with Eurydice questions on the transition from school to working life.

It should also be mentioned that links with the Council of Europe have helped encourage the flow of educational information between the European Community and other states in Europe. The joint management and financing of the multilingual Eudised Thesaurus is one example of this. The Thesaurus is meant to be an instrument for information processing in the field of education. to provide the Member States of both organisations with a regularly updated tool to facilitate the exchange of information.

I shall end at this point after having trespassed on the territory of my Eudised colleague who can no doubt clarify the little I have told you about Eudised.

A Help to Meet
The Information Explosion

Rolf Kristiansen, Hönefoss, Norway.

I am sure that we have a common experience - we have all seen - a tremendous increase in the flow of information, especially when we take the new computer or information technology into account. Too often we experience to be drowned in papers, publications etc, but without this kind fellow throwing out a "life saving" instrument. In this short presentation I shall try to give a brief description of a possible solution to this, the EUDISED system.

The acronym EUDISED has caused serious problems to many educators trying to decode a new cryptic description of a documentation aid. Not only educators but also many European politicians have been troubled by these letters organized in a funny way. Every year since 1968 there have been debates concerning economy, programmes for the future and questions concerning staff and relations to other international organizations.

The forum for these discussions have been The Council of Europe in Strasbourg, the core of this European Documentation and Information System for Education.

In 1968 an initiative was taken to carry out a general feasibility study of a European information system to cover the field of education. The experiences from this study led to a technical feasibility study in 1971, later on followed up by an elaboration of formats and standards for dataprocessing and exchange of information between possible partners in such a system.

WHAT IS EUDISED?

At this point in the presentation we should perhaps have a look into what EUDISED really is. The idea behind it was to set up a cooperative system among European countries to make available information on different aspects of education in Europe. Discussions had been on what type of information to include in a database who should the target group be and how should the system be operated.

Concerning content, it was in the late sixties much interest around research and development work. R & D activities were among the fields given first priority when the system should be tested in an experimental approach in 1974.

Another field was policy documents on educational matters in the different European countries. It seemed to be great interest among politicians at that time to get an opportunity to have immediate access to other countries' educational information. Looking to USA, researchers and documentalists had for some time studied the growth of ERIC, a national network with approximately 2o clearinghouses all over the country, each covering a separate field of educational information.

A consequence of this was that EUDISED also should be capable of carrying purely bibliographic information. Experiments were later on set up to test how educational periodicals could be covered (the EP-project). A parallel project to this was to study the possibility of using the system to cover audiovisual materials (the AV-project).

A strict definition of the target group created a new set of problems. Should the users, what we today would call the end-user, be academical staff at the universities, should they be the European politicians or should the target group also include teachers and administrative staff on different levels in local and central administration?

A clear-cut answer to these questions was never given, creating immediate problems when a set of selection criteria should be used. It was very difficult to arrive at a common platform of inclusion and rejection of candidate material to the system.

These two problem-areas: content and target group were complicated themselves - problems increased when the organization of the system was taken into account. The plan, which is still functioning, was to set up at decentralized network based on national agencies which could collect the information, edit it and deliver it to a central unit in a continuous flow of information into the system. At the moment national agencies in 17 countries are participating in the EUDISED-activities.

These national agencies has in the lo years of functioning operated in different ways. Some of them are in close connection with the national library or central documentation system in the country. Others are part of an educational institution, university or research unit. Still others are organized as more or less free-functioning bodies with a very independent position and with one aim: to deliver source material to the system EUDISED.

Due to the fact that these national agencies represent a heterogene group of nations, they are themselves creating a diversity of information to EUDISED which is both an asset and a drav-back. The information is coloured, depending on its origin, and at the same time this variation gives some sort of guarantee that a very broad field of interest is covered within EUDISED.

The flow of information is channelled from the national agencies to a secretariat in Strasbourg, Section for Educational Research and Documentation. Here the information is passed through an editing process before it is sent over to a publisher and a computer company in England to be prepared for storage in a computer system. Up till 1983, the information was only printed in the EUDISED Research and Development Bulletin, but from that year the database is also available on-line, in other words, you

have direct access to the information stored from your own terminal or microcomputer. I shall return to some technical details later on. First we shall have a brief survey of the development during the past 15 years.

THE DEVELOPMENT OF EUDISED.

Since 1968 EUDISED has developed through different stages. They can be listed and studied from the preparatory work in the first seventies to an extension to new fields and better retrieval services in 1984.

1968	General feasibility study.
1971	Technical feasibility study.
1972-73	Elaboration of formats and standards for data processing. Preparation of the multilingual thesaurus in English, French and German.
1974-75	Testing of EUDISED in the field of educational research and development (R & D).
1975-76	Spanish version of the multilingual thesaurus. Testing of EUDISED in the field of audiovisual aids (AV) and educational periodicals (EP).
1976	Presentation of EUDISED R & D Bulletin.
1977	Dutch version of the multilingual thesaurus.
1978-79	Updated and revised thesaurus in five languages.
1980-84	Formalization of cooperation with the Commission of the European Communities concerning thesaurus management.
1981-84	Extension of the thesaurus to cover special education and the teaching of modern languages.
1982	Second EP-experiment.
1982-84	Restructuring of the thesaurus.

1983 On-line access with European Space Agency (ESA).

THE MAIN TOOLS IN AN INFORMATION & DOCUMENTATION SYSTEM.

A basic objective for an information and documentation system is the promotion of co-operation in the field of educational information. In such a co-operation it is possible to link together national agencies and in so doing, to establish an educational database.

- a thesaurus for indexing and retrieving information;
- a software, format and standards for dataprocessing;
- available channels to facilitate the flow of information.

A thesaurus is a systematically organized list of keywords or descriptors to be used in the indexing of material. Different educational thesauri have been developed for an efficient and reliable retrival of information. Most of these thesauri are monolingual (e.g. ERIC and Psychological Abstracts), elaborated in one language without links to other languages, and appears on the basis of different philosophies of thesaurus construction.

Questions concerning thesaurus construction are often discussed, and among them are problems like pre-coordination or post-coordination of descriptors. Should the descriptor be superintendent role, or should the same content be expressed through two descriptors: superintendent and role, and with the exact meaning to be decided in the combination of the two words during the retrieval.

Another question is the arrangement of descriptors. Should the leading principle be a strict hierarchical presentation, is facetted presentation, a graphical presentation or terminogramme, or whould the descriptors be arranged in an alphabetical array. The choice of method

has implications for the use of the instrument during indexing and retrieval, and at the same time it may influence the possibilities of exchanging information between systems.

A third problem arises when cultural background and educational tradition are taken into account. How can a multilingual thesaurus take care of national or regional "specialities" in a harmonized cross-cultural approach?

The task of developing complicated multilingual thesauri for education together with the permanent updating and management must be the responsibility of international organizations. UNESCO/IBE (International Bureau of Education) presented their Education Thesaurus in English in 1973, followed by the French version in 1974. At the same time the Council of Europe presented its EUDISED Multilingual Thesaurus with equivalents in English, French and German.

The intention behind the UNESCO/IBE thesaurus was to cover English, French, Russian and Spanish, whereas the Eudised-thesaurus is now developing 15 different language versions. It is also adopted by the Commision of the European Communities as their official documentation instrument in the field of education, and a joint management and revision work is going on between Strasbourg and Brussels as a permanent activity. One of the main tasks now is the transfer of the thesaurus from a facet-oriented version to terminogrammes or graphical presentation.

THE DATABASE.

The usefulness of an I&D system depends upon the possible outcomes from the established databases within the system. The term database refers to the accumulated information within a defined field, and which is accessible for retrieval, manually or by a computer.

The content of the database must on the one hand be of relevance to the user, and it must on the other hand be structured in such a way that retrieval is possible without generating too much noise in the information output.

In the EUDISED system, information is at the moment primarily on research and development activities within the field of education.

Experimental work is going on the extend the service to articles in educational periodicals, and AV-material and teaching aids are also possible extensions. In the preparatory work for future development these ten cases were considered:

Journal article
Book
Chapter of a book
Conference proceedings
Conference paper
Report
Research project
Dissertation/thesis
Audiovisuals
Computer programme

The R&D activity is now a permanent service with the information published regularly in the EUDISED R&D Bulletin. The same information is transferred to the European Space Agency for on-line retrieval in the ESRIN-network. Other possibilities could have been EURONET or SCANNET, but the underlying principle is that the information is stored in a host computer, with retrieval services from different nodes in the network.

In addition to the usual on-line retrieval procedure, a new service has been announced lately. It is now possible to "download" information from the host computer.

With this procedure it is possible to retrieve parts of a database for further detailed retrieval locally. An example would be to dump all information related to special education to your own micro, paying for the dump, and with a license to do all further work without increased expences. For relatively isolated subject areas with high frequency of searching, this is the very best solution. Necessary updating of your local file must be done at regular intervals.

An on-line service can give the information consumer immediate access to the database, making available an enormous number of data elements. To transfer the data to a state of relevant and meaningful information, the documentalist must know the inbuilt structure of the database.

To increase the precision of the retrieval, the input of R&D information appears on a specially designed work-sheet, structured according to the record-format of the computer file.

During the input sequence, the descriptor field is of a crucial nature. The indexing of documents is performed according to the multilingual thesaurus, and the descriptors chosen are often the only key to retrieve a document or project description. This depends, however, on the retrieval language and available search strategies. The descriptor field is usually the first one to be examined, and the other searchable fields are later on used for support.

In some systems the possibility of a free-text retrieval is also available. The efficiency of the retrieval depends here upon the

use of a common terminology and concepts in project title, abstract and other parts of the description. At the moment, free-text retrieval without descriptor-oriented indexing, seems to be less efficient and with more noise in the output. With more sophisticated search strategies and a more consisted use of terminology among researchers, new possibilities of free-text retrieval may come.

In a neighbouring field another interesting trend is also found. The multilinguality of this systems belongs to the thesaurus, making the same descriptor available in other languages. Systems are now under development to undertake the task for automatic translation from one language to another. The first test from English to French has been done on parts of the EUDISED database, and with reasonable good results. This opens up quite new perspectives for the exchange of information in the years to come - with input of information in the native language - readable for other languages without knowledge of the original language. A bug-free translation cannot be foreseen, but the crossing of borders is easier than before.

EUDISED AND SPECIAL EDUCATION.

In the previous part of this presentation the fields of special education has only been touched. Implicit in the system we can find at least two reasons for that. At the outset of the EUDISED project in 1968 the intention was to cover the field of education as a totality without any special considerations for separate areas. Representatives from these areas have often critisized the system for it's lack of specificity, and at least parts of our field can be said to have had a bad coverage.

The other reason is perhaps linked to special education itself. As a fast-growing field of research and development the main tool of EUDISED, the multilingual thesaurus, has not been able to catch up with a rapid increase in the number of candidate descriptors for inclusion.

In 1978 EASE took an initiative in Strasbourg, asking for a possible extension of EUDISED.

The president of EASE, Olof Magne, was very active and left no doubt about the seriousness of the initiative. The next years left us with discussions and follow-up activities at national level, and in 1981 a proposal from the Norwegian government gained support from Sweden and Switzerland, resulting in a decision to extend the multilingual thesaurus to cover special education. A small conference took place in Strasbourg late 1981, and Ramon Puig de la Bellacasa and Rolf Kristiansen were asked to prepare a draft version.

Five successive drafts have been presented and they are to be evaluated at national level, both from a special educational perspective and from a linquistic perspective. This is not the easiest task, because it is very problematic to find linguistic equivalences, not only translations, when a multilingual thesaurus is to be built up. I hope you can imagine some of the problems when the same concept has to be given exact linguistic equivalences in 12-15 languages.

Another problem was met when it was decided to restructure the format of the thesaurus. The first version of the thesaurus was in what we call a facet structure, i.e. the whole field was devided in 21 facts, again subdivided and subdivided.

In addition to the facet structure there also existed an alphabetical array which was organized as a hierarchy within each descripter.

The first drafts were organized according to this, but when the new terminogramme structure was presented in 1983, it was necessary to rethink the proposals and their organization.

The EUDISED Multilingual Thesaurus contains at present 2.479 descriptors. The number or proposed descriptors to be added from the field of special education numbered 1.7oo in 1982. After discussions, reformulations, extensive use of associations and relations between descriptors, the number of surviving proposals are now 879. To reorganize them according to the new terminogramme structure is a rather complicated task. It has been necessary to create new terminogrammes in addition to the 42 orginally intended for use.

Parts of the proposed descriptors are now put together in a new structure, but there is only a small hope to be able to complete the work this year.

When this work has been completed, together with the linquistic equivalences, the EUDISED thesaurus should be a better instrument for indexing and retrieval of information from many different fields. The scope of EUDISED as a full-scale system for the whole field of education can only be fulfilled if the users are supplying the system with information which in turn may be of great worth to other users.

That should be a real educational cooperative.

Advantages and Drawbacks of The Information Technology in Relation to The Definition »Handicap«

Jørgen Hansen, Ministry of Education, Denmark.

Confronted with the perspective that the information technology, to a very great extent, will have a decisive influence on the development of society and the conditions of life, it seems relevant to ask:

Will the information society be an advantage or a disadvantage to the handicapped?

By way of introduction, I intend in the following to attempt to justify why I think the question ought to be put in a slightly different way:

Will the information society increase or will it reduce the number of handicapped persons?

If "handicap" is defined as the failure to fulfil the normative requirements which a society expects of its citizens in the educational system, in relation to work, housing and recreational situations, a handicap may be illustrated as a conflict between the person and his surroundings.

fig 1

By defining things in the way described, it follows that a handicap is not the same as a personal defect, which has been the predominant traditional view.

Of course, the ability to function or the normative adaptability of an individual plays a part in the existence of a handicap, but

equally important is society's ability and intention to adapt its offers and demands to the variations of physical and psychological ability represented by the citizens as a group.

In that way a handicap is placed as a dynamic or changeable phenomenon: It can be increased or diminished through equal efforts by the individual and society.

Through training, teaching and education the individual (all individuals) can develop his potential functional abilities, always within certain limits, however, but society can continue to develop its functional requirements towards individual consideration and compensation.

Weaknesses of sight, impaired hearing, intellectual retardation, motory dysfunctions cannot be cured, but to what extent individual deficiencies should be handicapping to the person concerned is very much a political issue which really concerns us all, handicapped as well as non-handicapped.

On the threshold of the information society this understanding of handicaps is more realistic and more necessary than ever, but for a long time it has been a fact that technologically advanced societies, such as for instance the Western European countries in the twentieth century, have experienced dramatic increases in frequencies of handicaps. In the educational sectors that is reflected in a constant increase of the group of pupils who cannot participate in the ordinary education and who are consequently referred to special instruction. The philosophy behind that approach to dealing with educational handicaps is on the whole that it is the pupil who represents the handicap and it is he or she who should receive treatment. The educational system, which in this respect is a reflection of the surrounding society, is acquitted and consequently it only invests modest efforts to adapt to the possibilities and needs of the weaker pupils. In fact very little is being done: It is an indisputable fact that over the past 2o-3o years the ordinary education of the European primary schools has become more and more intolerant of pupils with below-normal learning potential.

In the light of this - humanly speaking - regrettable situation special education is both required, acceptable and appropriate, but it can never be the best possible solution for a society and the responsibility of its educational system to all users, however different.

It is my firm belief that the new information technology will enable to further a society which is more flexible and more respectful of individuals, including an educational system which is less normative and which creates fewer deviants, but I am just as firmly convinced that the computer society can result in increased social degrading and incapacitation.

Whether the development will be in this or that direction depends on how we decide to develop and use the technology.

Already there are many examples of use of technology which does not in the least make it easier to have handicaps, but fortunately there are many examples that the information technology has been used to reduce the handicapping effects of a functional disability.

The complementary relations between the individual and his society - relations which, as we know, are handicapping to the individual (because one dares hardly call society handicapped when it fails to adapt to the varied needs of it's citizens) these relations must have top priotiry when analysing the advantages and drawbacks of the information society in relation to the definition 'handicap'.

This week we are together to discuss whether and how the computer can support the possibility of optimum development of handicapped persons, but at the same time thousands of computer experts, politicians, civil servants etc. at other conferences discuss how the information technology can support the productive effectiveness and competitive power of the respective societies in a world in which the race for economic growth is considered much more important that consideration for the well-being of the individual. For instance; right now Europe is heavily involved in an unlimited investment in new technology with the aim of overcoming the present superiority of the USA and Japan in this field.

As special education teachers we must keep this paradox in mind - a paradox which by the way is not a recent phenomenon and which to an increasing extent has characterized the growth of society over the past 100 years. We have brought in still more and still better resources to improve the active functional potential of the handicapped, and at the same time the number of handicapped persons has continued to increase in the sense that more and more citizens have found it increasingly difficult to cope with the demands and challenges of society.

These reflections may seem pessimistic and may stimulate the inarticulated voices who intermittently proclaims that we might as well give up special education as it is without any effect. But the truth is really that if we had not intensified special education during this period of development towards more and more technologized and complicated societies, the difference between the well-functioning and the less well-functioning citizens would have been much greater.

Indeed, the simple fact is that in order to look after the interests of the handicapped we in the educational sector must involve the new technology, if possible even more intensely, creatively and in a more goal-directed way than the other educational sectors.

At the same time, we can once and for all break with the isolationism which has characterized much - educationally speaking - good special education based on an idea of the needs of the weak for individual growth, sheltered from the surroundings.

As all other education, special education must support the potential of an individual for getting on in the society which is around him, or perhaps rather ahead of him.

Therefore, by means of special education among other things , the handicapped children, young people and grown-ups - but perhaps particularly the children and the young people - must learn to develop a functional relationship to computer techniques. That is, they should learn <u>about</u> the technology - what it consists of, how it works, what it can be used for, the risks involved etc.

And let us reassure those who may think (because of their ignorance of the subject) that these things are too complicated for many handicapped people: their fears are entirely unjustified. Already today, around Europe mentally retarded children are manipulating computers as if they had never done anything else.

The individual's own close relationship with the new technology is thus the first and foremost precondition for preventing the information society from increasing a handicap (in a few years ignorance of the information technology will be a handicap in itself). If this is emphasized so strongly, it is to warn against the risk that this area of special education is neglected. In several European countries computing has been introduced as an elective subject in the upper forms, and the result may be that it is not elected, for example at special schools, and that it is overlooked that precisely that subject should be introduced to handicapped pupils at a very early age. In that way it is possible in the long run, as already mentioned, to increase the possibilities of the children concerned to understand and function in the social life which lies ahead, but equally important is that to a great extent it is possible to prevent them from being seen and seeing themselves as handicapped already at school.

To render probable this assertion it can be constructive for a moment to turn the attention to the demands or norms which in the Western European countries, for example, constitute the handicapping elements of the educational system. In simplified form these normative elements can be listed as follows:

fig 2

(1) A common feature of our primary schools is - regardless of the philosophical reflections put forward in the official formulations of aims - that all pupils should learn the same and preferably equal portions of it so that they can leave primary school at the same level.

(2) This tendency towards normality represents a considerable challenge to teachers and pupils for an effective contribution and participation in the teaching situation. There is a lot to be learned in a relatively short time - there is no time for creative relaxation, for the effectiveness refers to the hard facts of the subjects: Knowledge and skill.

(3) Together the facts mentioned can be termed: Information. School demands of its pupils that they know about everything under the sun. The primary schools of certain countries have as much as 35 subjects.

(4) The acquestion of knowledge - or information - takes place by means of communication. Not one-way communication, as in the old days when the pupils were meant to sit passively while trying to pick up as much as possible of the teacher's lecture, but active participation in a process in which the pupils ability to respond means as much as the recipient function.

(5) Communication, and thereby the close, active interaction be between pupil and teacher and between the pupils themselves, reveals mercilessly the good and bad points of the individual. Aesthetic appearance in the widest possible definition - which has always been an important social factor of value - does not become a less important criteria in a school which to an increasing extent is based on close, active co-operation between the actors of the education.

(6) Naturally, this whole set of normative demands or expectations will unavoidably conflict with the fact that the potential possibilities for living up to the expectations of the individual pupils are very different. Of course that conflict is unpleasant and disturbing to the school system, which in complete agreement with classical teaching reacts by the defense mechanism we term dichotomy. The pupils who cannot handle the challenges reasonably well are placed in a separate group, after which the problems can be placed outside the ordinary school system and be solved by simply lowering the level of what is demanded of the pupils so that it corresponds to the potential qualifications of the separated group.

This brief analysis of some aspects of primary school activity must not be seen as a reproach or criticism. The primary school is - and must naturally be - a product of the society we live in and an important prerequisite in the development of the society of tomorrow.

We have started characterizing that society as the information society, and even though the perspective contains elements pointing in the opposite direction it seems most likely that the description of the general function of our primary school which has just been attempted will also hold true of the function of our society in the next 20-40 years. For that reason it is not unlikely either that the school will change its basic didactic and methodical elements radically.

While we as special education teachers, who must look after the pupils who cannot meet the minimum requirements of ordinary instruction, must continually point out the possibilities of avoiding too many failures through appropriate adaptations of the ordinary system, we must at the same time use special education, in the short run or in the long run, to make it easier for our pupils to enter that system on the system's terms.

In that connection the information technology is a tool which special education and its pupils may use, not least considering that if we do not use this means (when everybody else does) the result might well be that quite automatically, in an indirect sense, it will be used against us!

Because, the truth is that as unpragmatically and unrealistically it is to consider a handicap as a personal problem - in other words an individual defect - it is equally unproductive and unuseful to consider and treat it as a product of an intolerant, normality dominated society.

The continued efforts of the individual to develop his or hers functional potential and society's - perhaps particularly the educational system's-support of those efforts should always be the most important element in the endeavouring to help or minimize the effects of a handicap.

In this attempt to analyse some of the possibilities or impossibilities which may be involved in the information technology with regard to the weaker individuals, I have first of all concentrated on society and only secondly on the individuals themselves. The reason for that is partly that most descriptions and discussions of handicaps have so far almost always begun with the deficiencies of the disabled, defect, difficult or handicapped etc. person and only rarely have they gone beyond that. But it is also partly due to the fact that the support which special education should be to the pupil referred can be understood, arranged and carried out far more relevantly and functionally when carried out in the realistic recognition of the mechanism of school and society which have created the need and which still - regardless of the referring to special education - is a challenge to that individual.

It holds true of the society of the future as well as of the personalities to whom it represents a challenge that they are complex and complicated phenomena. Of course, there has always been a close correlation between the organization of a given society and the personalities of it citizens.

Where the class structure of earlier times and the often poor occupational mobility, with consequently poor social mobility, created rather simple, but many different, types of personality, our time is characterized by fewer types, but in return types which are far more varied and all-round.

It has become more difficult just to master one role - preferably one should master them all!

Approaching the matter from that angle I have found it to be constructive to attempt to describe the pupil's personality as a function of 6 physical or phaychological factors as a basis to a diagnosis of special didadictics and education.

The function can be illustrated in the following way:

fig 3

To a very high degree of probability it can thus be maintained that the information technology can also be used in the efforts of special education to develop the personal potential of handicapped pupils, to meet the challenge it is to be a citizen in a complicated and demanding society.

Of course it is also possible to employ the technology in such a way that it does not benefit the adaptation to society of the weak pupil, but that is a risk of all special treatment.

If this speech has not turned out to be as provocative as I really had wanted it to, it is undoubtedly because I am basically a kind and peaceful person.

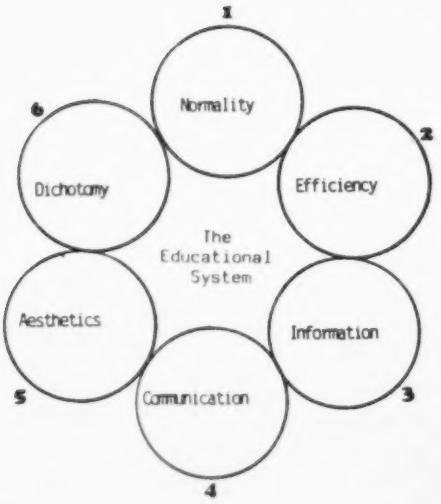


Fig. 2. The demands and norms which constitute the handicapping elements of the educational system.

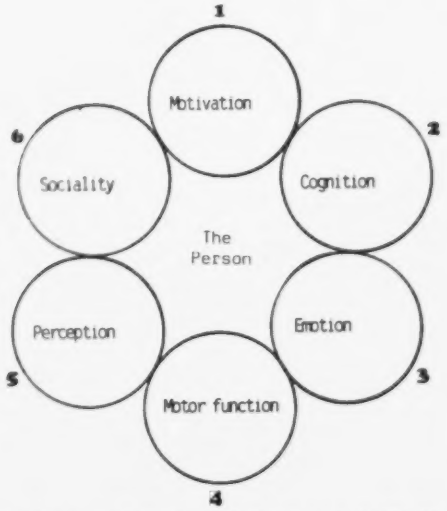


Fig. 3. The physical or psychological factors as a basis to a diagnosis of special didactics and education.

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